



**UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO**  
**PROGRAMA DE MAESTRÍA Y DOCTORADO EN GEOGRAFÍA**

**LOS PAISAJES DE LA GENTE**  
**MAPEANDO USOS DEL SUELO, PÉRDIDAS, EXPECTATIVAS,**  
**MIEDOS Y DESEOS EN TRES COMUNIDADES DE MICHOACÁN**

**TESIS**  
**QUE PARA OPTAR POR EL GRADO DE:**  
**MAESTRO EN GEOGRAFÍA**

**PRESENTA:**  
**ADRIÁN ORTEGA ITURRIAGA**

**DIRECTOR DE TESIS:**  
**DR. MICHAEL K. MCCALL**  
**CENTRO DE INVESTIGACIONES EN GEOGRAFÍA AMBIENTAL**

**MORELIA, MICHOACÁN, MAYO 2018**



Universidad Nacional  
Autónoma de México

Dirección General de Bibliotecas de la UNAM

**Biblioteca Central**



**UNAM – Dirección General de Bibliotecas**  
**Tesis Digitales**  
**Restricciones de uso**

**DERECHOS RESERVADOS ©**  
**PROHIBIDA SU REPRODUCCIÓN TOTAL O PARCIAL**

Todo el material contenido en esta tesis esta protegido por la Ley Federal del Derecho de Autor (LFDA) de los Estados Unidos Mexicanos (México).

El uso de imágenes, fragmentos de videos, y demás material que sea objeto de protección de los derechos de autor, será exclusivamente para fines educativos e informativos y deberá citar la fuente donde la obtuvo mencionando el autor o autores. Cualquier uso distinto como el lucro, reproducción, edición o modificación, será perseguido y sancionado por el respectivo titular de los Derechos de Autor.

## AGRADECIMIENTOS

En primer lugar, al Posgrado de Geografía UNAM; el mundo ha cobrado un nuevo significado: el espacio es ahora detonante de todo tipo de reflexiones. Sin temor a equivocarme, puedo afirmar que la geografía es nitroglicerina pura. A raíz de esta maestría, ningún estudiante se librará de escuchar la magia con la que la geografía puede desordenar las rigideces y ofrecer los instrumentos para reinventar el mundo. Ya hay víctimas pululando por ahí.

Por supuesto, al Consejo Nacional de Ciencia y Tecnología (CONACYT) por la beca otorgada para poder realizar este trabajo. En un país con tantas asimetrías económicas, fue un privilegio contar con un apoyo que me permitió sumergirme completamente en el conocimiento. Es una experiencia invaluable.

Mike, it has been a great pleasure –and challenge- working with you. I have taken all your valuable comments and critiques with all seriousness. I am truly thankful because your accurate and many times intriguing questioning have always triggered a strong hunger for reading, exploring and reflecting. You also were incredibly patient with my poor English. Thanks for allowing what you always called my “poetry”. Please, thank Margaret for me, she was very supportive too.

Alejandro, Brian, Chucho y John; muchas gracias por tomarse el tiempo de leer este trabajo y aportar sugerencias muy valiosas que ayudaron a robustecerlo.

Fernanda y Constanza, los mapas de esta tesis no habrían existido sin su ayuda. Gracias por desvelarse y ayudarme. Aún queda la deuda de una llave rota.

Tzitzí, porque compartir el campo siempre trajo buena charla. Gracias por confiar en mí. Recordar los viajes a Nieves me ha traído el antojo de un pan recién horneado.

A la gente de Nieves, Tumbisca y Laurelito que participó en la elaboración de esta tesis; queda una gran deuda difícil de saldar.

Dr. Gerardo Bocco, el apoyo que me has brindado ha sido vital.

A mis alumnos del Liceo Michoacano que, sin saberlo así, han contribuido aguantando literatura de gran complejidad que era de mi interés.

Los culpables de todo esto, mis padres, que siempre me cobijan con los mejores deseos. Empujando. Siempre empujando.

Tania y Alonso, por revitalizar este mundo y darle un poco de sentido. Toda esta tesis se caería, precisamente, sin el futuro como dimensión fundamental.

Kátia: porque puedo ahora poner el punto final y abrazarte en nuestra habitación.

Quieren / que sólo se oiga el tic / siempre el tic / y que no se oiga el tac  
They want / only to hear the tick / always the tick / and never to hear the tock

**León Felipe**

---

ojalá siembra futuro / y el futuro es un imán  
wishing sows the future / and the future is a magnet

**Mario Benedetti**

## Table of Contents

|  |    |
|--|----|
| Chapter 1: Land, Landscape, Home.....        | 1  |
| INTRODUCTION .....                           | 1  |
| THE MATERIAL LAND .....                      | 5  |
| THE USEFULNESS OF LAND.....                  | 5  |
| THE ABSTRACT LAND.....                       | 6  |
| THE EXPECTED LAND .....                      | 7  |
| LANDSCAPE .....                              | 7  |
| LAND USE CHANGE .....                        | 9  |
| PARTICIPATORY LAND USE PLANNING (PLUP) ..... | 11 |
| PARTICIPATORY MAPPING .....                  | 12 |
| GENERAL OBJECTIVE.....                       | 15 |
| Specific objectives.....                     | 15 |
| Research questions .....                     | 15 |
| LITERATURE REVIEW .....                      | 16 |
| Landscape.....                               | 16 |
| Future landscapes .....                      | 19 |
| Land Use .....                               | 19 |
| Participatory Land Use Planning.....         | 20 |
| Territory and social organisation.....       | 22 |
| <i>Ejido</i> .....                           | 23 |
| Livelihoods: multiple perceptions.....       | 26 |
| Methodology .....                            | 27 |
| Participatory Mapping.....                   | 27 |
| Participatory photo-mapping.....             | 29 |
| Chapter 2: Mapping of expectations.....      | 31 |
| INTRODUCTION .....                           | 31 |
| EXPECTATIONS: NEEDS, DESIRES AND FEARS ..... | 34 |
| MAKING EXPECTATIONS VISIBLE .....            | 37 |
| EXPECTATIONS: HAZARDS.....                   | 38 |
| MAPPING SCENARIOS OF LANDSCAPES .....        | 41 |
| PLANNING WITH EXPECTATIONS .....             | 42 |
| Chapter 3: Nieves, Tumbisca & Laurelito..... | 44 |

|                                      |    |
|--------------------------------------|----|
| INTRODUCTION .....                   | 44 |
| METHODOLOGY, METHODS AND TOOLS ..... | 44 |
| Preparation .....                    | 45 |
| Calling for participants .....       | 45 |
| Framing the area .....               | 46 |
| Materials .....                      | 46 |
| Pilot test .....                     | 46 |
| The mapping.....                     | 47 |
| Before drawing .....                 | 47 |
| Voice records.....                   | 47 |
| Present map .....                    | 48 |
| Past map.....                        | 48 |
| Future maps .....                    | 48 |
| Information processing.....          | 48 |
| Digitalisation .....                 | 48 |
| Data aggregation.....                | 49 |
| NIEVES.....                          | 50 |
| Women .....                          | 52 |
| Methodological conclusions.....      | 56 |
| Findings conclusions .....           | 57 |
| Men.....                             | 58 |
| Methodological conclusions.....      | 61 |
| Findings conclusions .....           | 62 |
| Youngsters.....                      | 63 |
| Methodological conclusions.....      | 64 |
| Findings conclusions .....           | 65 |
| Key informants.....                  | 65 |
| Methodological conclusions.....      | 70 |
| Findings conclusions .....           | 71 |
| The dark side of avocado .....       | 72 |
| TUMBISCA.....                        | 75 |
| Landholders.....                     | 77 |
| Conclusions .....                    | 80 |
| Children.....                        | 81 |

|  |     |
|--|-----|
| Boys.....  | 83  |
| Girls .....  | 84  |
| Mixed group .....  | 85  |
| LAURELITO .....  | 87  |
| Conclusions .....  | 91  |
| Chapter 4: General conclusions & Discussion .....                  | 93  |
| DISCUSSION .....   | 93  |
| The process of mapping .....                                       | 94  |
| Everyone can map .....   | 94  |
| Leadership and passivity .....                                     | 95  |
| Better things to do! .....   | 96  |
| Shy or bored? Confident or not?.....                               | 97  |
| Visualisation .....  | 98  |
| Edges .....  | 98  |
| Scale and quality.....   | 99  |
| Superman view .....  | 99  |
| Local and External.....  | 100 |
| Expectations in the `future` map .....                             | 101 |
| The content of the landscapes .....                                | 102 |
| The moving landscape.....  | 102 |
| The marketing of the landscape: land sales and their impacts ..... | 103 |
| Landscapes of fear .....   | 105 |
| Landscapes of rural poverty and globalisation .....                | 106 |
| Landscape as autonomously controlled forest.....                   | 108 |
| Landscape: the dichotomy of nature.....                            | 109 |
| Participatory Land Use Planning.....                               | 110 |
| The Utopian landscape .....  | 111 |
| CONCLUSIONS.....   | 113 |
| FUTURE RESEARCH .....  | 118 |
| REFERENCES .....   | 119 |
| Annex 1. ....  | 130 |
| Annex 2. ....  | 137 |

## **List of Tables**

|  |    |
|--|----|
| Table 1. Mapping Sessions Held .....               | 52 |
| Table 2. Mapping Synthesis.....                    | 54 |
| Table 3. Women`s Land Use Perceptions.....         | 54 |
| Table 4. Men`s Land Use Perceptions .....          | 60 |
| Table 5. Mapping Synthesis.....                    | 63 |
| Table 6. Key Informant`s Land Use Perceptions..... | 68 |
| Table 7. Mapping Sessions Held .....               | 77 |
| Table 8. Landholder`s Land Use Perceptions .....   | 78 |
| Table 9. Women`s Land Use Perceptions.....         | 88 |



---

## List of Maps

|                |   |
|----------------|---|
| <b>Map 1.</b>  | Past Land Uses Identified by Women from Nieves                        |
| <b>Map 2.</b>  | Present Land Uses Identified by Women from Nieves                     |
| <b>Map 3.</b>  | Future Land Use Expectations Identified by Women from Nieves          |
| <b>Map 4.</b>  | Desired Land Uses Identified by Women from Nieves                     |
| <b>Map 5.</b>  | Feared Land Use Changes Identified by Women from Nieves               |
| <b>Map 6.</b>  | Present Land Uses Identified by Men from Nieves                       |
| <b>Map 7.</b>  | Past Land Uses Identified by Youngsters from Nieves                   |
| <b>Map 8.</b>  | Present Land Uses Identified by Youngsters from Nieves                |
| <b>Map 9.</b>  | Future Land Use Expectations Identified by Youngsters from Nieves     |
| <b>Map 10.</b> | Desired Land Use Expectations Identified by Youngsters from Nieves    |
| <b>Map 11.</b> | Feared Land Use Changes Identified by Youngsters from Nieves          |
| <b>Map 12.</b> | Present Land Uses Identified by Authorities of Nieves                 |
| <b>Map 13.</b> | Future Land Use Expectations Identified by the Authorities of Nieves  |
| <b>Map 14.</b> | Past Land Uses Identified by the Community of Nieves                  |
| <b>Map 15.</b> | Present Land Uses Identified by the Community of Nieves               |
| <b>Map 16.</b> | Future Land Use Expectations Identified by the Community of Nieves    |
| <b>Map 17.</b> | Desired Land Use Expectations Identified by the Community of Nieves   |
| <b>Map 18.</b> | Feared Land Use Changes Identified by the Community of Nieves         |
| <b>Map 19.</b> | Present Land Use Changes Identified by Landholders of Tumbisca        |
| <b>Map 20.</b> | Present Land Uses Identified by Boys from Tumbisca                    |
| <b>Map 21.</b> | Past Land Uses Identified by Boys from Tumbisca                       |
| <b>Map 22.</b> | Future Land Use Expectations Identified by Boys from Tumbisca         |
| <b>Map 23.</b> | Feared Land Use Changes Identified by Boys from Tumbisca              |
| <b>Map 24.</b> | Desired Land Use Changes Identified by Boys from Tumbisca             |
| <b>Map 25.</b> | Present Land Uses Identified by Girls from Tumbisca                   |
| <b>Map 26.</b> | Future Land Use Expectations Identified by Girls from Tumbisca        |
| <b>Map 27.</b> | Desired Land Use Expectations Identified by Girls from Tumbisca       |
| <b>Map 28.</b> | Present Land Uses Identified by Mixed Group from Tumbisca             |
| <b>Map 29.</b> | Past Land Uses Identified by Mixed Group from Tumbisca                |
| <b>Map 30.</b> | Future Land Use Expectations Identified by Mixed Group from Tumbisca  |
| <b>Map 31.</b> | Desired Land Use Expectations Identified by Mixed Group from Tumbisca |
| <b>Map 32.</b> | Present Land Uses Identified by Women from Laurelito                  |
| <b>Map 33.</b> | Past Land Uses Identified by Women from Laurelito                     |
| <b>Map 34.</b> | Future Land Use Expectations Identified by Women from Laurelito       |
| <b>Map 35.</b> | Desired Land Use Expectations Identified by Women from Laurelito      |
| <b>Map 36.</b> | Feared Land Use Changes Identified by Women from Laurelito            |

---

# Chapter 1: Land, Landscape, Home

---

## INTRODUCTION

In the last decades there has been rising concern about the multi-scale environmental crisis, ranging from the whole planet to small villages, that threatens the security and development of human societies. Global and local futures are of great interest to academic institutions, Governments, NGOs and social organizations preoccupied with driving the world to a sustainable order. Recently, special attention has been placed on food security and rural livelihoods in developing countries that, paradoxically, are suppliers of food, raw materials and cheap labour, and face high levels of poverty, inequity, violence and unsustainable conditions. Holistic and integrative approaches that seek to understand nature and society as an interdependent and dynamic substance have been reworked in order to create more effective and powerful alternatives for social development and ecological conservation. The man-land geographic tradition, as described by Pattison (1964), is core in numerous scientific studies, among them, in human geography. Integration of the local spatial knowledge in the landscape planning process has been acknowledged to be of key importance (FAO & UNEP 1997), and even a matter of respect to the governed (McCall, 2004). Participatory Land Use Planning (PLUP) is one of the many frameworks that seek to emphasise the importance of including participation, local

knowledge and community empowerment as crucial elements for successful integrated development. PLUP is about negotiating at a local scale the more sustainable use of space through dialogue and consensus (Schwedes & Werner 2010). Thus, it considers local interests, aspirations and knowledge in space. Landscape is a strong and pertinent concept because it provides a flexible spatial unit where human life takes place, not just as material environment, natural resource for development, cultural manifestation or platform where societies organise their relations; but also as symbolic expression reflecting ideas and meanings about the world.

Mexico has a rich diversity of natural settings and of cultures that use and manage ecosystems and the natural resources by dwelling in the landscape. Interactions between people and land have a long history and have undergone many changes. Lately, rural areas have been facing severe environmental problems, strong land use changes and ownership changes associated to the depreciation in value of farm products, economic globalisation, migration and urban concentration. In this context, the Mexican Government has recognised the necessity of having an environmental strategy for the development of the country, which comprises the safeguarding of natural capital by enhancing the way in which natural landscapes are managed so that a sustainable use is achieved. This strategy is numbered as 4.4.1 of the National Development Plan 2013-2018 (Gobierno de la República, n.d.), and consists of “Implementing an integrated development policy that links environmental sustainability with the costs and benefits to society”. More important for this research is the sixth line of action, which states: “Promote an integrated territorial planning, considering ecological management and land-use planning, in order to achieve a sustainable regional and urban development”. It is thus politically acknowledged that spatial planning is required to aim for a sustainable future that guarantees the protection of the natural capital whilst promoting social welfare. Nonetheless, the unsustainable conditions in which the three communities we visited for this study live show that little has been done to successfully achieve this objective. Also, the lack of governmental programmes to plan for a sustainable future with the local people evidence a low interest to actually implement community built development. On the contrary, social and environmental problems were voiced.

Forests in Mexico are mainly under common property tenure –approximately 80% of forest area (FAO, 2004)-, and represent important environments that support forest livelihoods. Many forest products are used both as subsistence resources –firewood, mushrooms, and medicinal plants- and as commercial products –resin, wood, fruits (Delgado *et al* 2018). Moreover, forests provide ecosystem services such as water, clean air, rich soils and pollination, among others, which are essential to develop rural activities –agriculture, livestock and forest production. The importance of forests goes beyond the adjacent communities and direct users, to regional and even country level, because they are great stocks of natural resources and processes that help regulate both natural and human-made landscapes. The sustainability of the ecological services of forests depends on how the landscapes are used and the type of changes they have to face, whether positive or negative. Intensive agriculture, for example, causes strong alterations in forests, especially in terms of deforestation, ecosystem fragmentation and loss of original flora and fauna. Proximity to growing cities also threatens the security of natural environments and cultural traditions. Globalisation and external market demand for products are highly complex pressures that have an important influence in land use change, and the permanence of forests and the cultural values attached to these landscapes.

In the last decades, increasingly since 1960, avocado production has rapidly extended in Michoacán, particularly in highland pine-oaks forests (Barsimantov & Navia Antezana 2012), shaping the landscape to large areas of avocado orchards. Two historic periods can be identified in the evolution of avocado landscapes registered by Thiébaud (2010), the first, from 1950 to 1990, in which avocado production shifted from backyard fruit trees for household consumption, to monoculture production. At this stage, avocado orchards began to replace maize and wheat croplands, cattle pastures and coffee orchards. Forest areas were also cleared by timber entrepreneurs. Three benefits stimulated the land-use change: 1) good opportunity of avocado in the food market, 2) wood from trees was used to manufacture wooden boxes for packing avocados, and 3) sawmills benefited from wood extraction. The second break point, in the decade of 1990s, was of political character, and four policies can be identified as decisive (Thiébaud, 2010; Barsimantov & Navia Antezana, 2012): 1) the reform to the 27<sup>th</sup> article of the Mexican Constitution in 1992 that marked the end to the land distribution to the landless and deprived, and which led to the certification

of individual land property rights in 1994<sup>1</sup>. Moreover, for the first time since the land repartition initiated with the Constitution of 1917, this reform allowed the conversion of social property into private property through land division into plots, 2) the 1992 Forestry Law, which sought to end harvest control bureaucracy by replacing certificates to transport timber with a hammer stamp and which led to a high level of illegal logging, 3) the North American Free Trade Agreement (NAFTA), which came into force in 1994, and impacted negatively the basic grain economy –particularly maize in Mexico- due to the inability of local farmers to compete with the new prices, and instead promoted the production of fruits, especially those associated with warm weather, and 4) the United States border opening to avocado exports in 1997, which, until then, prohibited the entry of Mexican avocado arguing sanitary reasons. The combination of these four policies in conjunction with the environmental suitability of the zone, nurtured the proliferation of avocado in the highlands of Michoacán. Nowadays, avocado landscape continues to expand and reach new forest areas. There is a strong dichotomy regarding avocado production, on the one hand, it is highly profitable in monetary terms making it attractive to many, but at the same time it carries serious environmental problems such as deforestation, surface water depletion and groundwater reduction, soil erosion, risk of landslides, variability in precipitation and moisture, wild species removal, and social inequity, among others (Thiébaud 2010).

This research centres on the study of the landscape, particularly in terms of land use change and changeability, from a participatory spatial perspective. We place special focus on local land future expectations which we believe are a product of experiences stored in the collective and individual imaginations of communities. They provide relevant information for PLUP, and can be portrayed by employing a participatory mapping approach. Our inquiry is about a particular people and their land as a living part of the landscape. People drawing what their land is used for and for what benefits, what their expectations and fears are. People making their own maps. To test this, we approached three communities from two different *ejidos* in the surrounding areas of Morelia city, and worked with small groups

---

<sup>1</sup> Under the argument of “giving certainty about land tenure and freedom to decide on its use and assignment... to provide greater justice to the rural environment of the country”, the Government promoted the national Program for the Certification of Ejidal Rights –PROCEDE- (Procuraduría Agraria, n.d.).

of women, men and children. Different perspectives helped build a broad picture of the local realities concerning land use.

## **THE MATERIAL LAND**

Land is a polysemous term, it can mean many things. Maybe the most primal meaning is that of solid substance that supports life and can be touched and moulded. The concept of land embodies an anthropic nature: of control, of dominion, of power, of survival and of home, among others. Whether it is the dusty crust that differentiates land from water in a photograph of the Earth from space, the *terra firma* glimpsed and yelled by a sailor, or the hoed soil for growing crops; land is palpable and useful. More than 50% of Earth's land surface has been directly transformed by humans (Hooke et al. 2012). It has been deployed, depleted, eaten, designed, redesigned, colonised, emancipated and repaired. The whole world experiences human effects through the globalised economy that forces an environmental global change —land use change from natural landscapes to agriculture for food production, intensive natural resources extraction, loss of traditional knowledge and techniques of landscape management, among many—. Population growth, economic development and changing life-styles have led to the expansion of humanised land and global change that impact local realities. *Ejidors* are not exempt from these pressures and face many changes.

## **THE USEFULNESS OF LAND**

Land is used by people. What land is used for depends on both cultural and social agreements, and decisions shaped by people's minds full of personal needs, desires and fears, blended with experience, values, memories, knowledge and emotions which continuously sculpt the landscape (Greider & Garkovich 1994). As Dardel (2013, p. 92) points out: "Landscape is not, in its essence, made to be looked upon, but, rather, is an insertion of man into the world, a site for life's struggle, the manifestation of his being and that of others, a basis for his social nature". Land is therefore used as a human essence for

social existence. Humans occupy a piece of land and find a use for it, develop a meaning and become attached to that specific place, which is usually called *home*<sup>2</sup>. This has been fully addressed by Yi-Fu Tuan in his sense of place research and theorisation. “When space feels thoroughly familiar to us, it has become place” (Tuan 2014, p.73). What makes it familiar? Experiencing it, feeling it, appreciating it and living daily in it: “Space is transformed into place as it acquires definition and meaning” (Tuan 2014, p.136). Such is an individual and a social construction, place is a construction created by words, that induces to a network of communication and validation, and gestures that reinforce the words and their meaning. “In the most literal sense, we create place with sticks and stones. A built object organises space, transforming it into place” (Tuan 1980, p.6). Land has a potential that is utilised based on an anthropic capability, usually learned or inherited. It might be for collecting resin, mushrooms and wild berries, building an airport, dumping wastes, growing maize or avocados, enjoying beautiful sceneries or shooting a volleyball; basically for any human activity that actually happens in a physical space and modifies it somehow and where a specific culture settles. People live in the land with all the needs, goals, hopes, prejudices, fears, experiences that being human entails.

## **THE ABSTRACT LAND**

Land can also be abstract and imaginary, an idea: when we think of land, we can think of *what* we would like to *do* to our land. But this is not necessarily practical, feasible or effectible. In fact, land begins as an idea that turns into a fantasy that is afterwards performed. We can dream how we would like the landscape to be. But is it realistic? Can it actually happen? Possibilities are infinite and the future is hardly predictable, yet a picture can be portrayed by motivations, experience and trends. This alternative type of vision of land, which exists in the fictional environment of the mind and is actually intangible,

---

<sup>2</sup> Maybe the most meaningful place of all is home, not just as town or city but as the tangible construction of a house. “Home is an intimate place”, says Tuan (2014, p.137) and is also supported by Bachelard (2013, p.61), who argues that a house is “...a space of comfort and intimacy... ..a space that should condense and defend intimacy”. Whereas Tuan speaks of *home* and Bachelard of *house*, they both find a sense of intimacy attached to the core of all places. The house is, therefore, much more than a shelter against rain and thunders, it is an intimate uterus for unique and free thoughts, knowledge, feelings, moral energies; it is “an instrument to confront the cosmos” (Bachelard, 2013, p. 59).

uncertain and unrealised, can be anticipated and projected through possible or alternative scenarios of the ultimately-uncertain future. It is through abstraction that we imagine our future. Whether we can also plan our future (land) and operationalise it depends on many concrete limitations and alternative drivers. However, the unachieved utopia can be represented as a visual scenario of the ideal.

## THE EXPECTED LAND

Another notion of land emerges: an *expected* land. To expect is “to think that something will happen”. In Latin, *expectāre*<sup>3</sup> means to “anticipate”, to “await” or to “hope for”<sup>4</sup>. This is very close to the abstract and imaginary land but it is limited to the specific vision of what is plausible. And what is plausible is the outcome of a historic and present context that establishes a complex dynamic between people and every other agent with which they interact. Expectations combine cultural, economic, social and political trends that originate from previous experiences. It is through experience that expectations find concrete manifestation. Expectations are also dependent on resources and an overall landscape capital, which encompass every material or immaterial asset, natural or cultural, that can be somehow useful. Time is likewise an important matter when thinking about expectations. Since land is dynamic, it is susceptible to change based on human behaviour and human attitudes, particularly, in terms of wishes and needs. Expectations are not static, thus they change with time and, nowadays, are deeply susceptible to global codes.

## LANDSCAPE

Landscape has been widely discussed both in physical and human geography, and it can range from a merely abstract and scenic representation to a cultural “phenomenon that exists through practice” (Olwig 2009, p. 245). Here, landscape takes on the second

---

<sup>3</sup> *Expect* and *spectacles* share the same etymology: *spectāre* that means “to look”. Both allude to a visual activity that is personal and subjective. People expect different things. People see things differently. Many spectacles are embedded in one landscape and, thus, many perceptions, many expectations.

<sup>4</sup> <http://www.latin-dictionary.net/search/latin/expect>



meaning, as landscape that is lived and alive and that can find representation by those who perform in that reality. Humans, we believe, are a constitutive part of the landscape, as dwellers, interpreters and carvers of their world, and it would be a mistake to separate them as isolated and reducible elements for analysis. On the contrary, people are believed to be a vivid component of the landscape itself (Olwig 2009). Their knowledge and stories are different portrayals of the same complex and dynamic landscape, and mapping is only one, but a very effective, way of bridging representation to a spatial language.

Landscape is a permanent social construction and interpretation (Greider & Garkovich 1994), hence, also temporal and historic. It has been previously defined as a palimpsest that is rooted to the land. As Milton Santos wrote in 1996:

“Landscape is a continuous and overlapping writing; it is a set of objects of different ages, an inheritance of many different moments. (...) Being susceptible to irregular changes through time, landscape is a set of heterogeneous forms, of different ages, pieces of historic times that are representative of the diverse ways of producing things, of constructing space” (pps.64-65).

Landscape, being a human artefact, is dynamic, thus the same place can be approached as a historic vessel of physical and social scars, vestiges and evidence of what once was, and it can provide old pieces and learnings for understanding the present or forecasting the future by identifying patterns (Antrop 2005). Landscape is also a spatial entity in the present with specific bounds, laws, social structure, climate and daily life activities measurable for acknowledging a current situation. Finally, landscape is an unknown situation as well. An uncertain and non-materialised possibility that is subject to be altered.

A landscape perspective is followed in this study since it provides an integrative framework of analysis. Landscape is lived, and as a lived dimension, it encloses man-land processes of which land use is one. Landscapes have a material appearance that is woven by natural and social processes, most often, intertwined. As humanised environments they are codified by culture, thus having particular meanings and values. In the last decades, this has been addressed and strongly promoted by approaches seeking to plan for sustainable futures

through community involvement (FAO 1999), such as Landscape Planning (Selman 2004), Community-Based Natural Resource Management (Kellert et al. 2000), Sustainability (Antrop 2006), Land-Use Planning (Amler et al. 1999) and Participatory Land-Use Planning (McCall, 2004).

In this research we sought to map the landscape, through the participation of local users, in three temporal dimensions, paying special interest in future expectations. Because local people are the actors in the everyday activities with decision and transformation faculties, they inherently have a profound and rooted experience, more influence and more genuine knowledge on how their landscape change and might change than external parties (Zube 1987; McCall & Minang 2005; Fagerholm et al. 2012). Our expectation is that local perceptions about the future of the land, through visual and spatial representation, can provide a strong basis for land use planning.

## **LAND USE CHANGE**

At a global scale, land use change has been identified as a global environmental problem (Klooster & Masera 2000; Lambin et al. 2001; Mas et al. 2004). At the local level, however, land use is a complex reality that may, or may not, be perceived as a problem. Mexican *ejidos*, being culturally attached to natural environments but highly marginalised, currently face strong environmental issues. Communities with forest livelihoods in Mexico have to cope with land use changes that include ecological and development stresses, which affect more fiercely in developing countries (Klooster & Masera 2000). Problems related to land use change in forest areas usually include deforestation, soil erosion, decrease in water availability, loss of flora and fauna, pollution, among many more. Worldwide, agriculture is considered the main cause of deforestation, although many factors that influence forest clearing should be added to this (Houghton 1994). Although the published rates of deforestation in Mexico are quite variable depending on the data source<sup>5</sup> (Mas et al. 2009), what is certain is that forests are being depleted by human activities (CONAFOR, 2001).

---

<sup>5</sup> The average rate of deforestation supported by academic sources is of 838,500 ha/year whereas official sources recognise an average of 492,100 ha/year (Mas et al. 2009).

Forest loss impacts direct and negatively in many ways: biodiversity, local weather, soils, ecosystem services, sedimentation of water bodies, recharge of underground water, air quality, floods, health, livelihoods, economic opportunities, etc. (CONAFOR, 2001; Lambin et al. 2001); which may often result in increases in social inequity (CONAFOR, 2001) and vulnerability (Lambin et al. 2003) of communities that are already dealing with plenty of stresses (Klooster & Masera 2000)<sup>6</sup>. People who manage, use and live in Mexican forests are mainly *ejidatarios*<sup>7</sup> and *comuneros*<sup>8</sup> who are commonly affected by a high level of marginalisation (CONAFOR, 2001). Many are economically dependent on their ecosystems, particularly those with forest-based livelihoods.

Much quantitative research has been developed to study LU change in terms of spatial relations, patterns and measurements by using GIS. Spatial analysis has provided valuable knowledge by relating *a priori* selected variables. However, land use change, understood as a human process, is complex and dynamic, with plenty of pressures both local and external (Geist & Lambin 2002; Lambin et al. 2003). Several causes have been described or associated: population growth, migration, supply and demand of products - e.g. timber, NTFPs, agricultural, animal products, etc. - urbanisation, technology and globalisation to name a few (Houghton 1994; Lambin et al. 2001). In reality, such causes, however, do not occur isolated but blended, and do not affect in the same way in different places. People face dilemmas daily, e.g. conserving and safeguarding the forest, or clearing and selling wood for meeting short-term needs (Klooster & Masera 2000). Addressing peoples' perceptions and subjectivities and landscapes as human realities are of key importance to understand LU change.

Deforestation, although it might be one of the most violent transformations of the landscape, is not the only land use change. Shifting from conventional organic to non-

---

<sup>6</sup> Health, education, food security, pollution, transportation and income opportunities are mentioned by Klooster and Masera (2000) for the case of Mexico. Additionally, CONAFOR (2001) in the Forest Strategic Program notes a lack of connection between people and forest resources, illegal logging, weak social organization, extreme poverty and migration.

<sup>7</sup> See chapter 1.6 for detailed information.

<sup>8</sup> Like *ejidatarios*, *comuneros* are rural possessors of land and land resources, mainly indigenous. The difference between the two types of property –*ejido* and *comunidad*– is that whilst *ejidos* received land by the Agrarian Reform, *comunidades* were restituted with what they used to own historically before the confiscations of 1856 (Sánchez Luna 1995).

organic or transgenic crops may not be noticeable in satellite or aerial imagery but it sure represents a difference in social, economic and ecological terms, and there are complex circumstances and backgrounds that drive the action. Or, e.g., two patches of forest may look alike but one of them is used for ecotourism, whereas the other provides non-timber forest products to a community. Land use, unlike land cover, is not always visible or recognisable (Di Gregorio & Jansen 2000) to those who ignore the local reality. Understanding land use in terms of social process, nonetheless, is important despite the lack of visual/pattern change. Land cover changes may be seen as fingerprints of human behaviour, whilst land use change is the actual hand leaving the evidence. Land use involves, intrinsically, a human activity, hence, there are a range of reasons and motivations to maintain or change the landscape. Such motivations, which are both personal and social, are framed in a territory with rules and roles, where land<sup>9</sup> is organised and owned under a political order, though also subject to external forces. Age, gender, economic class, productive activity and heritage, among many more, are significant features that shape individual and collective decision-making.

### **PARTICIPATORY LAND USE PLANNING (PLUP)**

PLUP is essentially a process of community negotiation to design and manage the most equitable, efficient and sustainable landscape. Because land is primal in rural communities, securing future production for the coming generations is of key importance (FAO 2009). Participation in LUP is flexible and can mean many things; nonetheless, it is essentially about integrating a wide array of people that pursue a shared goal. In some cases, PLUP can be a response to the inefficacy of institutions commissioned to administrate and allocate financial capital and to develop long-term plans for rural development when they fail in doing so (Amler et al. 1999). It also seeks to change the planning exercise from a conventional top-down to a bottom-up process, providing access and voice to the local users that are commonly ignored (IFAD 2014). Above all, PLUP is about dialogue and

---

<sup>9</sup> “Land is a relation of property, a finite resource that is distributed, allocated and owned, a political-economic question. Land is a resource over which there is competition” (Elden 2010).

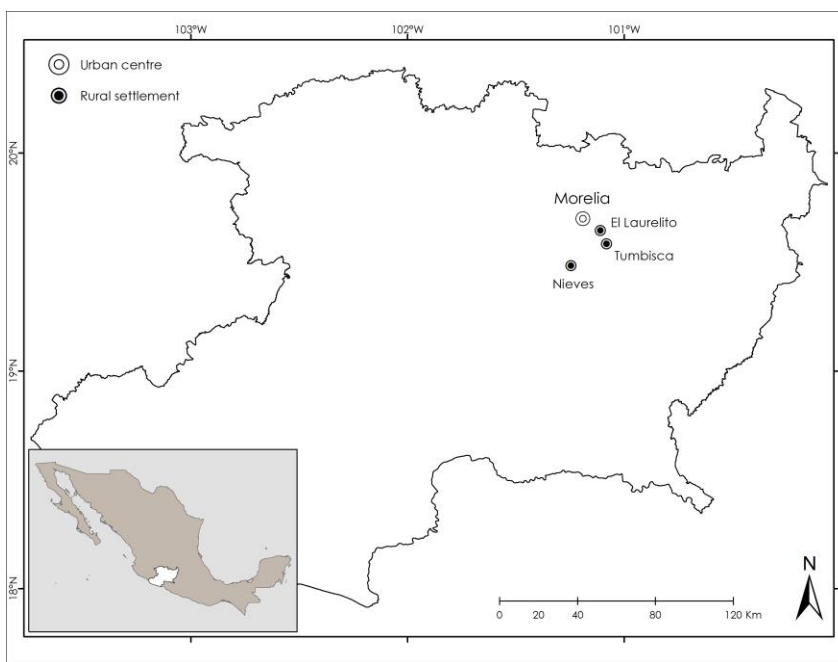
sharing own-interests to reach consensus in order to take decisions that affect all. Sustainability has been placed at the core of PLUP, being the main goal to achieve, as a means to preserve nature, promote economic development and social welfare.

Men and women have different skills and play different parts in the rural landscape management (Sunderland et al. 2014). Access to resources, responsibilities, power and control over land and resources are gender-specific and influence perceptions (Rocheleau & Edmunds 1997; Cavendish 2000; Sunderland et al. 2014; Villamor et al. 2014). Such differences sometimes have effects on how the landscape is valued and what the priorities and fears are. In rural Mexico, agriculture is mostly a male occupation led by the male head of the household and his sons (Appendini 2009). Transfer of agricultural knowledge is generational and gender-specific. Women are more likely to have home responsibilities - cooking and child care- and to collect non-timber forest products. Furthermore, differences of use and perception are also frequently found between the young and adults (Alcorn 2000) and are explored in this research. Thus, expectations about present and future land uses are believed to diverge between gender and age. Participatory landscape planning should feed from as many voices as possible, so different local interests and knowledge need to be included (Kalibo & Medley 2007; Fagerholm & Käyhkö 2009).

## **PARTICIPATORY MAPPING**

Participatory mapping has proven to be an efficient methodology for the recognition of local perceptions and local spatial knowledge (Herlihy & Knapp 2003; Chapin et al. 2005; McCall & Minang 2005; Chambers 2006; Rambaldi et al. 2006; Di Gessa et al. 2008; Pearce & Louis 2008; Fagerholm & Käyhkö 2009; Raymond et al. 2009). Although levels of participation have been questioned and continue to be controversial (Pretty 1995; McCall 2003; Cornwall 2008; Debolini et al. 2013), plenty of local studies are being developed (McCall 2015). Local knowledge and information are vast and can be addressed from many disciplinary angles. P-mapping, Participatory GIS (PGIS), Public Participatory GIS (PPGIS), Participatory Resource Mapping (PRM), Community Mapping (CM), Participatory Spatial Planning (PSP), Participatory Research Mapping (PRM), amongst

others, share the same target: to include local ordinary people into the mapping and planning praxis. It is now accepted that indigenous/traditional/local/non-scientific spatial knowledge is relevant, unique, useful and synergetic when partnered with scientific/external/institutional knowledge (Mackinson & Nøttestad 1998; Folke 2004; Debolini et al. 2013). Although P-mapping has been applied for many objectives, such as resource and water management, boundary and conflict resolution, historic reconstruction, depiction of local knowledge and values, etc., little work can be found regarding people's future expectations for their land. An important contribution is the PLUP guide developed by the FAO (2009), which includes an entire module on mapping community's future and gives important background about imagining possible futures. This research contextualises the possible changes in the land use in two Mexican *ejidos* through different group perceptions and expectations of future land use.



Three general scenarios are employed for guiding the range of perceptions about land use in three small villages of Michoacán: Nieves, Tumbisca and Laurelito. “*Continuity*” or how people think their landscape will be in the future if change continues in the same

vein; “*ideal*” or the desired landscape pictured by ambitions and wishes; and “*horror*”, an apocalyptic version of the worst that could happen to their land. The last two are complementary and in opposition at the same time, from the description of one extremity the other can usually be anticipated. In order to support and gain better understanding about the future scenarios, two other land use maps have been produced: current land uses, which works as a reference to compare changes, and past uses under an approximate time frame of

10 years, which can provide relevant information to understand trends, expectations and future projections.

The main objective of this research is to portray different local land use scenarios by different actors (past-present-future), which would be expected to aid in the land use planning endeavour. To reach this goal, a participatory mapping approach is employed in order to depict different local spatial knowledge and visions. This research is intended to make a contribution by demonstrating that significant reliable information about land use and LU change can be depicted by rural people in Mexico and that such information may have a great value in landscape planning.

However, the results of this research are only a small part in the highly complex local realities of the communities, and the PLUP framework. Experience from literature suggests that the inclusion and recognition of the local people into the landscape planning can help in empowering communities that have been excluded from decision and policy making and planning processes, especially in developing countries, although many complex conditions have to be met in order for this to really happen. It was not our intention to build a direct empowerment of the communities as a result of this research, although making and wielding maps have been related with holding power<sup>10</sup>, and we can only wish that the resulting maps will somehow benefit their current situation.

---

<sup>10</sup> “The truth is... maps are weapons. ...weapons which work ... by linking territory with what comes with it, something they achieve by fusing onto a common plane multi-coded images of the very world the map itself will bring into being” (Wood 1992, p.66-73).

## **GENERAL OBJECTIVE**

Explore the local land use expectations through the spatial portrayal of different land use scenarios for different periods of time, and thus changes over time – past, present and future-, in order to analyse relevant local knowledge and information, by means of applying Participatory Mapping methodology and tools in three Mexican communities: Nieves Tumbisca and Laurelito.

## **Specific objectives**

1. Look into the triple temporality of the landscape by integrating local spatial knowledge and expectations about past, present and possible future land uses.
2. Contrast the views, interests, concerns/fears and perceived change drivers of different actors — men, women, youth and key agents — about expectations of land use and land use change.
3. Elucidate perceived problems associated with current land use.
4. Identify general criteria, values and preferences that drive land use expectations.
5. Evaluate the Participatory Mapping methodology in terms of the performance both within and between groups of participants.

## **Research questions**

1. What are the temporal changes in, and expectations of, local landscapes identified by the local users?
1. What are the main reasons behind realistic land use expectations, whether change steers towards the ideal or feared scenario?
2. How are changes in the landscape differently perceived by men, women and the young?
3. What are the main problems associated with current and future land use?
4. What are the main preferences that drive land use expectations?
5. What differences emerge in terms of performance both within and between groups of participants in the map making?



## LITERATURE REVIEW

### Landscape

“...any landscape is composed not only of what lies  
before our eyes but what lies within our heads.”

—D.W. Meinig

The concept of landscape has shared an intimate history with geography since the foundation of the discipline and continues to be subject of theoretical inquiry. The concept has found developments in art (Cosgrove 1985) and as a regional organisation of community, of politics (Olwig 2009). Many definitions of landscape have been addressed on the basis of different geographical frames. Duncan and Duncan (2010) reviewed the historic evolution and branching of the concept, from the most general delimitation of land and environment to a perceptual and experiential phenomenon. For this research, since our inquiry looks at local peoples' landscapes that have been historically moulded, used and inhabited, landscape takes the definition of material surrounding where people live in all the full human sense. Thus, landscape is both material and immaterial; both objective and subjective –and intersubjective; both physically visible, and sensible and imaginable; both natural and artefact; both indomitable and manageable. It is essentially dichotomous in its human-environment condition. Joan Nogué beautifully underlined this dual relationship by stating that:

“Landscape is at the same time both a physical reality and the cultural representation that we make of it: the external and visible physiognomy of a determined portion of the earth surface, and the individual and social perceptions that it generates; a geographical tangible and its intangible interpretation. It is simultaneously signifier and signified, container and content, reality and fiction” (2006a, p. 136).

A landscape may be considered as ideal or flawed, useful or useless, worthy or insignificant - it all depends on the mind that is constantly reading and crafting from it, because everybody has different needs, desires, interests, purposes, ideas, nightmares and means that shape the place in which they live. In other words: landscape is the material

appropriation – physical and mental - of the natural environment in order to suit human needs and aspirations, and it is lived with intention and purpose, thus it is socially produced. Even the study of landscape is initially a self-centred ambition and, such study, will inherently be driven by personal or social interests.

“Personal judgment of the content of landscape is determined further by interest. Geography is distinctly anthropocentric, in the sense of value or use of earth to man. We are interested in the part of the areal scene which concerns us as human beings because we are part of it, live with it, are limited by it, and modify it” (Sauer 1925, p. 302).

Landscapes are simultaneously a physical and a social construction changing over time (Antrop 2000). Landscapes store resources and provide services for human life: they integrate plenty of environmental processes (Nassauer 2012). Society and nature are constantly trading energy and mould each other mutually (Matthews & Selman 2006), their existence is a relentless relationship. Landscape is more than just a warehouse or a scenario for anthropic development, even more than a complex relationship. Landscape is an organic reflection of those who are inhabitants and essential part of that reality<sup>11</sup> (Greider & Garkovich 1994), inseparable to the everyday experience (Yamagishi 1992). People use, interpret and enjoy their environment in different ways (Antrop 2000). A forest can mean and be different things for different individuals; a lake can light up different emotions or thoughts depending on *whose* mind is interacting with it; space can be used for different purposes when unique complex human beings filled with knowledge, emotions, needs, desires, fears, values and experience face the dilemma of what they can do with what they have (Meinig 1979; Tuan 1979; Antrop 1998). What we understand by “landscape” varies from one person to another; it can be sculpted to suit different backgrounds. Meinig (1979) classified ten notions of landscape in order to differentiate the possible emphases of the concept: as natural, as habitat, as artefact, as system, as problem, as wealth, as ideology, as

---

<sup>11</sup> Because we are also the space we live in, we incarnate space. It is a dialectic relationship of mutual shaping. Gaston Bachelard ([1957], 2013, p.172), in his book “The poetics of space”, quotes the poet Noël Arnaud: “*Je suis l’espace où je suis*”, *I am the space where I am*. Then, two levels of space emerge: the occupying space, being in space, and the impersonated space, being space.

history, as place and as aesthetics. For this study, landscape takes on meaning of *problem*<sup>12</sup>, since: “it evokes a reverence for nature, a deeply felt concern for the earth as habitat, and a conviction that we have the scientific ability to right these wrongs” (p.40). We should highlight that most of the times, especially in rural environments, it is an external actor who finds interest in certain environment where he *sees* problems, something to amend. Landscape as history, because: “every landscape is an accumulation” (p. 44), and of *place*<sup>13</sup>, because: “in this view every landscape is a locality, an individual piece in the infinitely varied mosaic of the earth” (p.45).

Landscapes change continuously and they do so depending on a changing life-style (Antrop 2006). They are usually bombarded by external forces –globalisation, economy, international policies, climate change, etc.- but also driven by inner pressures and possibilities (Massey 1991). Nowadays, fluxes of information travel relentlessly through the world and influence decisions that modify the material dimension of the environment (Claval 1999). The transformation of the landscape is highly dependent on possibilities, capabilities and power.

“The production of space is the outcome of the action of men who act upon their own space, through natural and artificial objects. Each type of landscape is the reproduction of different levels of productive forces, material and immaterial, for knowledge is also part of the productive forces role” (Santos 1996, p.62).

As already stated, landscapes are not just material settings but are also forged by perception and cultural coding that give meaning to a particular place, and change in time, thus are historic. Landscapes are differently felt; they are experienced both individually and collectively. No landscape is perceived or constructed identically between actors, although

---

<sup>12</sup> Although this may sound romantic and ambitious and the real scope of work may be, on the contrary, limited –by time and means–, the feeling of pursuing a beneficial impact –although small– persists. “It is not that every landscape is in crisis, but that each one is a challenge, every landscape induces a strong itch to alter it in some way so as to bring about a more pleasing harmony and efficiency” (Meinig 1979, p.40).

<sup>13</sup>Particularity exhorts to approach landscapes –and the challenges embedded in them– with specific designed spectacles. Places have own personality. “Carried further, one may discover an implicit ideology that the individuality of places is a fundamental characteristic of subtle and immense importance to life on earth, that all human events *take place*, all problems are anchored in place, and ultimately can only be understood in such terms” (Meinig 1979, p. 46).

they may have similarities amongst members of social groups with shared values. Attributes that wield an affective meaning, which comes by experience, are more likely to stand out when visualising a broad picture (Thompson 2012).

### **Future landscapes**

Landscapes can be fertilised and incubated in the imagination and pictured as future scenarios by taking as reference the current and lived place (FAO 1999). Landscape expectations can, therefore, be projected as a plausible reference attached to a particular place in order to decrease uncertainty and promote adaptiveness (Wollenberg et al. 2000). But is it utopian or dystopian? If sustainable goals are to be met, as is the contemporary fashion for socially fair, economically equitable and ecologically respectful; utopic and dystopic landscapes are needed in order to frame beneficial and deleterious roads. Such scenarios, however, should be expected to differ from one place to another and among social groups since local characteristics vary and so do the dichotomous limits of good-bad, adequate-inadequate, suitable-unsuitable, etc.

### **Land Use**

Land has a primary essence of surface, but it is mostly a living surface, a working surface, a framed surface, the support of human livelihoods. Land can be regarded as a complex reality where social activities –particularly economic and political- happen in a particular place perpetually and relentlessly, as do the material outcome of actions of using and changing the biophysical components. To think of land requires distinguishing a political and an economic spatial extent: an ownership of property. But it is also a reminder of limit, because land is not infinite. As Elden (2010, p.806) asserts: “Land, though, is not something that can be created, but is a scarce resource, one whose distribution and redistribution is an important economic and political concern”. Thus, land is capital and possession, and owning land is an exercise of power.

Nowadays, drawing a distinction between land cover and land use becomes relevant in the recognition of local knowledge by defining the latter as a product of human presence and thus of experiences. Land use is mainly of qualitative character, since it comes from a lived experience, and has a social history and cultural meaning. Land cover and land use concepts are frequently misused and inter-changed, however, the difference between them is simple and quite important: while the first is essentially used in spatial analysis as a visual interpretation of patterns, lines, texture and colours of the earth's surface, the second entangles necessarily a human intention, which is then translated as an interaction —many times visually indiscernible— with the landscape. It is accurately defined by Di Gregorio & Jansen (2000): “*Land use is characterized by the arrangements, activities and inputs people undertake in a certain land cover type to produce, change or maintain it*”. Under this view land cover is superficial whilst land use is profound<sup>14</sup>. People *live* in a landscape<sup>15</sup>, which can be systematically fragmented into land cover classes, as daily performers and carvers of their lived environment who use the land in a particular way. Understanding the usefulness of the land as process thus calls for the participation of the local users who shape their world in a meaningful way, and provide relevant insights for social and spatial research.

### **Participatory Land Use Planning**

By recognising the landscape and the use of the land as human products and processes that are continuously being produced, local actors –the producers- become essential for LUP. Participation in planning the future involves a democratic and inclusive practice to make a better use of the local resources, as well as strengthening adaptation to local variability through the legitimisation of local knowledge (McCall 2003).

---

<sup>14</sup> Yi-Fu Tuan, in his text *Surface phenomena and aesthetic experience* (1989), develops both the surface and the unseen. There is no primacy of one over the other, rather a dualism that produces a rich area in-between. In this research we sought to disclose the mysteries lying under the surface through the interpretation of satellite images by the actual users, because: “We live in a world of fair appearances, but something of greater value –a reality not directly accessible to the senses– lies behind them” (p.235).

<sup>15</sup> The etymologies of the words landscape, *landschap* and *landschaft* have been analyzed by Olwig (2004) to recognise an ancient phenomenological meaning of the word, where the land is shaped by particular polities. The landscape integrates both the natural setting and the community that shape the land of dwelling.

“Planning of land use should not be a top-down procedure, but a decision support mechanism, intended to guide the land user or decision-maker through the process of choosing the best land-use option, or range of options, consistent with his or her objectives” (FAO 1999).

For achieving PLUP it is indispensable to know the local objectives and different views. But not just the objectives; rather the needs, wishes and hopes that drives such objectives. Before offering options —market demands, soil qualities, carrying capacity, etc. — it is incumbent to identify the main interests and expectations of the landscape users. LUP is mainly about discussing different views and decisions that will have an impact in the future. Turning the planning endeavour into a participatory process shows an evident concern for legitimising other types of knowledge —local, traditional and indigenous— that are commonly ignored, but also a new challenge for external policy agents to empower local planners with own initiatives (McCall 2003). Including the local actors in the planning process help boosts communication, analysis, organisation and common understandings (Tan-Kim-Yong 1992). In rural areas that either produce basic goods or environmental services or both, planning must integrate and encourage economic, social, legal, political, technological and biophysical aspects (FAO & UNEP 1997) and it is absurd to do this without involving local participants –in particular those recognised as local experts.

Amler et al. (1999, p.7) argue that “land use planning creates the prerequisites required to achieve a type of land use, which is sustainable, socially and environmentally compatible, socially desirable and economically sound”. However, such a definition should be addressed carefully, since sustainability and welfare are contested concepts. Sustainable for whom? Socially desirable for whom? Economically sound for whom? Who establishes the outlines? Even amongst local people in a local scale, differences will arise. Agreements on these fundamental conceptualisations are needed.

The concept of land is closely linked to that of territory, which frames a portion of land by a political organisation. People live organised in territories and shape their relationship with their landscape as a result of political and economic settlements, use land bounded by property limits and social regulations. Land use and PLUP are therefore territorial matters.

## **Territory and social organisation**

The idea and concept of territory has had a long history and changed over time, from before the Greek to the formation of Nation-States and the present. Albeit the essential element of territory is the land, the political, economic and social character of the concept makes it difficult to define, hence, flexible and particular. However, generally speaking, territory is about the exercise of different forms of power distributed differently around the world (Elden 2011). Different power cells can be found in a same landscape, thus different territorialities. Territory, however, usually has more rigid limits that are socially identifiable, whilst landscapes are outlined by scientific or external purpose (McCall, 2016). “Territory is often straightforwardly understood to be a bounded space under the control of a group” (p. 261). Moreover, Elden (2010) speaks of territory as a political technology, in which techniques are used for measuring land —land understood as property, as a resource and as space where scarce resources are distributed, allocated and owned— and controlling terrain —terrain as power, heritage and order-. In opposition to this idea, Antonsich (2010) portrays territory —*territoire*, since he builds on the French definition— as: “...a social space, produced by specific social practices and meanings which turns territory into both a ‘semiotised’ and a ‘lived’ space” (pp.424-425). Lévy (2011) classifies territory in eight significations, from which “a limited and controlled space [...] that fits into the logic of the state, the latter marrying an internal political space on the one hand with strict external borders on the other” (p. 273), and “an appropriated space [...] [where] territory is understood as the element of identity, or say representation, of a space” (p. 274) are of particular relevance when working with territory as land – landscape- with social and political organisation.

Although the landscape concept provides a strong basis to analyse a particular reality where nature and society coexist, it is insufficient when working with land tenure. Territory compliments with a strong emphasis on land property. Ownership of land entails a particular complexity that encompass cultural heritage, history, strong rooted identities, access to resources and either holding power or being disempowered.

“Territory has a significant connect with performance because it entails and incorporates, while at the same time it signifies meanings of authority,

whether political, legal, customary, cultural, or simple raw power. Thus, territory is a political administrative term [...] Land tenure institutions and policies determine who holds, accesses and uses the land and resources, and under what conditions. They specify the rights, the mechanisms and modalities, and ultimately the rules” (McCall, 2016, p. 5-6).

Ownership of land in Mexico is divided into public, private and communal, where the latter is also subdivided into *ejidos* and *comunidades* (INEGI, n.d. [a]). Mexico has a land area of 196.7 million hectares, where 89.6% is rural land and is distributed between private property (41%) and social or communal lands (58.6%). Only 1.4 million people own private land. Communal land is owned by 3.5 million indigenous and peasants (Romero Ibarra & Morales Jurado 1999). 3.5 million people whose livelihoods are rooted to their land. *Ejido* is described in the next section, because all three communities with which we worked in this research fall into this category.

### ***Ejido***

In Mexico, the *ejido* is one of the main forms of rural social property and organisation, and at the present faces important processes and pressures of change, some examples are: temporary migration to work in the cities, definitive migration, undermining of social and cultural cohesion, loss of land value, and selling of land. Thus, the *ejido* is a specific form of territory. They are territories of identity, memory, feelings, power, meaning, organisation, shelter, distribution, ownership, control, experience, heritage, and vertical and horizontal relationships. *Ejidors*, as other kinds of social property around the world are constantly “produced, mutable and fluid” (Elden 2010, p.812).

Vestiges of a pre-Hispanic ancestor of ejidos found within the *Mexicas* are described by Zúñiga and Castillo (2010). They were called *tlamilli* and *altepetalli*, an ancient variety of communal land. These types of property, however, were not predominant at that time. The contemporary *ejido* owes its history mainly to the Mexican Revolution (1910-1921), the element of the 1917 Mexican Constitution which expropriated big private ranches for agrarian distribution to those who lacked enough land to satisfy their needs or did not



owned land at all, and to the Agrarian Reform (1915-1992) which for over 77 years expropriated and redistributed rural land; 26 thousand ejidos were formed. In 1992 free distribution of land to peasants in need ended (Zúñiga and Castillo 2010), although constituted *ejidos* still have the legal possibility to ask for an extension. While population growth has put pressure on natural and rural environments, the percentage of people living in rural communities has decreased from 57% of the national population in 1950 to 22% in 2010 (INEGI, 2010). The attraction of urban lifestyles, rural poverty, lack of working opportunities in rural areas, a decreasing spatial extent of land to support population growth, and overexploitation of natural resources, among other issues, push people to migrate and look for better opportunities in the cities.

*Ejid*os are recognised by Article 27 of the Mexican Constitution and the respective Agrarian Law as a social form of property (INEGI n.d. [a]):

“*Ejido*; is the portion of land, forest or water that the government delivered to a peasant population nucleus for its exploitation. *Ejidal* lands are non-seizable, non-lapsable and inalienable”.

*Ejid*os are self-regulated lands administrated by three bodies of authority: Assembly – *Asamblea*-, the supreme organ in which all *ejidatarios* participate; Commissary – *Comisariado Ejidal*-, a committee of people responsible of executing the agreements made by the assembly and composed of a president, a secretary and a treasurer; and Supervisory Board –*Consejo de Vigilancia*-, in charge of monitoring that the executions, internal regulations and agreements made by the *assembly* comply with the law (INEGI n.d. [a]; FIFONAFE 2010). Two other types of political actors perform in the *ejido* reality, *posesionarios*, who are owners of land by recognition of the assembly but do not have political presence nor vote in meetings, and *avecindados*, those who are recognised as political members with voice and vote in community decisions but are not owners of land, although they have the right to receive land if so decided by the assembly (Procuraduría Agraria n.d.).

Assignment of land can be of three types: Lands for human settlement –*Tierras para el asentamiento humano*-, areas needed for the development of community life; Lands for

common use –*Tierras de uso común*-, which correspond to non-parcelled nor reserved for human settlement and represent the economic sustenance of the community life; and Parcelled Lands –*Tierras parceladas*-, plotted lands distributed among members that can be exploited individually or collectively (INEGI, n.d. [a]).

The 1992 reform of Article 27, which opened the possibility of turning the *ejido* from being community-based land tenure to that of individual certificates of parcelled land, had an enormous impact in political and social signification. The idea of the land has been changing from being a family legacy and with implications within a community to an individual plot. Belonging to an *ejido* as a reality of social property is losing its essential character. As Torres-Mazuera (2012) argues: “today, what is transferred is not the legal category of agrarian subject but rather the land; what can be alienable is the parcel, not the condition of being an *ejidatario*, which can only be conferred by the agrarian assembly” (p.84). New generations are growing with a new category of *ejido*, and such a phenomenon deserves to be analysed properly.

Nowadays, as a consequence of the amendment of Article 27, *ejidos* face a dynamic of disintegration since they are being sold into private property following the market logic. Initially, irrigated lands or those with urban or touristic potential are those that are being traded. It is to be expected that agricultural plots that depend on rains should be next (Zúñiga Alegría & Castillo López 2010). Land prices are fixed by quality, extent and fertility and often ignore cultural and social values (Vázquez 2013). Selling of communal land is often a contested issue because inside the communities there will be those who want to sell and those who look forward to conserve, and, either way, conflict debilitates social cohesion. The case of Piedra Labrada, Veracruz, documented by Flores López (2011), in which nearly half of the *ejido* was sold in the first decade of the twenty first century helps to illustrate. As a response to the fracturing of the *ejido*, the remaining elderly owners started bequeathing their land to the women who showed a more protective attitude towards the family legacy and could be key agents for the continuation of the community.

## **Livelihoods: multiple perceptions**

People have different capacities, different assets and dedicate their time to different activities that result in different outcomes in the everyday life. That has been conceptualised as: livelihood (Krantz 2001; Scoones 1998 and Chambers & Conway 1992). As described by Chambers and Conway (1992), livelihoods can be inherited, created, influenced by environmental changes or pressures, and learned. In rural communities, men and women are usually born into a prescribed role: men are taught agriculture and/or forestry occupation whereas women learn household responsibilities, such as cooking, child care and gathering of wild foods and medicinal plants. This traditional gender assignment of activities has an effect on livelihoods making it necessary to study men`s and women`s livelihoods separately. Roads and transport that connect previously isolated communities to cities open the opportunity for the creation of new or mixed livelihoods (Appendini 2010). Mass media exposure to a huge amount of information can also affect and change livelihoods, especially in youngsters who can be wooed more easily by urban livelihoods. Environmental phenomena like droughts, floods or changes in the precipitation regime, and economic events such as drops in the prices of crops or forest products are also variables that may compel people to change their core activities, hence, their livelihoods.

Rural livelihoods rely strongly on natural resources and agriculture, therefore, on the physical components of the landscape (slope, temperature, soil, vegetation and fauna, among other aspects) and their quality. Ecosystems are natural stocks of wild comestibles, medicinal plants, water, fodder, resin and a wide variety of wood uses (fuelwood for cooking and heating, construction, selling, etc.) that provide resources for living and are sustaining over time. Natural resources can be used straightforwardly (e.g. mushrooms, water and fuelwood) or can be sold to raise money –e.g. wood and resin- (Cavendish 2000) and transformed into economic capital<sup>16</sup>. Communities with traditional uses of the forest benefit from a large variety of products (Pretzsch 2005). Rural livelihoods in Mexico are forest -or agriculture- dependant or a mixture of both, 89% of the country is rural land.

---

<sup>16</sup> For Further reading on the four types of capital (natural, economic, human and social) see Scoones (1998): “Sustainable rural livelihoods a framework for analysis”.

Close to 80% of the forests in Mexico are under social property (either *ejidal* or communal) and provide forest products for 8,500 agrarian nucleuses (FAO, 2004).

Land use is a livelihood matter, and vice versa. They are not in a cause and effect relationship, rather they are dynamically inter-dependently or, as described by McCusker and Carr (2006): co-produced. The landscape is the artefact where all these co-productions take place. Both land use and livelihoods entail objects and actions in space, and since neither nature nor humanity is homogeneous, multiple realities are being constantly produced, multiple perceptions and understandings. The world stretches by human reading. Participatory Mapping is a valuable methodology to explore and vindicate different kinds of readings, of knowledge, Local Spatial Knowledge (LSK) among them, that have been neglected by rationalistic and positivistic approaches. As argued by Debolini et al. (2013): “map-based interviews [...] represent an interesting first step towards supporting the integrated management and planning of complex natural and socio-economic systems that are increasingly spatially oriented for many relevant topics such as agriculture, forestry, water, and the landscape” (p. 32).

## **Methodology**

The main objective of this research is to look at different local visions of the landscape, particularly how they have changed and might change. It is of key importance to use local spatial knowledge directly from the actual users of the landscape. Participation of different social actors in the landscape is also central. To implement this, we organised participatory mapping workshops where people were able to create their own maps with their own knowledge, and discuss the information amongst them.

### Participatory Mapping

The disengagement from maps as pure scientific and specialised constructions and the moves towards the integration of local people as architects of their own cartography become more widespread in the beginnings of the 1990s (Chapin et al. 2005; Chambers

2006). Earlier methodologies influenced the germination of participatory mapping in Latin America<sup>17</sup>. What is important is the worldwide inclusion of ordinary people into the map crafting, and furthermore, the identification of local specialists with the unique spatial knowledge they wield and the value that such knowledge represents in scientific research, local empowerment and in landscape planning. As a qualitative method, it opens a channel of communication for those who are frequently silenced or ignored by the elites that wield power, and allows people to represent their geographies in a geographic language (Corbett & Keller 2004). It includes marginalised people and their experiences with the official data which will later feed the planning and the policy-making (Aitken & Kwan 2010).

Local inexperienced—in cartography— people can make good, useful maps on their own (Chambers 2006). Mapping is a language that can be learned and shared and, when mastered, can be used to communicate ideas, knowledge, wishes, fears, ambitions, expectations, etc. Participatory Mapping or Community Mapping is a “map-making process that is undertaken at the local level [...] showing the relationship between a community and the space in which it exists” (Corbett and Keller 2004, p.26). Nowadays, being sustainability a trendy political concept, perhaps one of the most important arguments to demand policy-makers to engage in participatory processes, from which PM is one of them, is the undeniable and strong ties that link the rural people with their environment (Corbett & Keller 2006). Heterogeneity calls for methodologies, such as PM, that are inclusive, flexible, adaptive, progressive, and above all, that values, respects and helps legitimate different kinds of knowledge and ontologies (McCall 2014; Rambaldi et al. 2006).

Participatory Mapping can be used for locating hazards, tracing mobility routes, natural resource management, bounding land uses, and many more applications that seek to unravel local interests, priorities, knowledge and values (Chambers 2006; McCall 2006). The degree of precision needed of the information mapped on a sheet of paper can be argued; precision is debatable since spatial reality is fuzzy, in real life, things move; e.g. water bodies, forest boundaries, land limits, natural cover, etc. (McCall 2006). If the mapping objective is to claim or restore territorial boundaries however, then a higher degree of

---

<sup>17</sup> Indigenous mapping (Chapin et al. 2005), Participatory Rural Appraisal and Rapid Rural Appraisal (Chambers 1994).

precision is important. For this research here, precision is not a primary objective because we are interested in what the land is and might be used for. In relation to this, participatory land use mapping

“...consists of representing the geographical distribution of specific features (environmental, demographic, social and economic) in a particular territory as perceived by community members... ..Land use mapping is especially useful for providing a snapshot of the local situation, including property boundaries, the location of key resources, features of particular importance to the community, etc. The map can be a valuable resource for future impact assessment and monitoring exercises. As a snapshot of the land-uses at a particular point in time, it is a source of baseline data” (Borrini & Buchan 1997, p. 138).

Mapping people’s landscapes is done through local knowledge as a means to “put the community on equal status with outsider ‘experts’...” (McCall 2004, p. 8). By doing this it is recognised that local knowledge is equally valuable than scientific or formal knowledge, not disregarded but on the contrary useful and highly important in spatial planning. All kinds of knowledge share the same purpose: understand, interpret and practice the world (Blaikie et al. 1997), albeit practical differences concerning how it is acquired and used. In rural communities, land –landscape- is a place –their place- and has deep cultural and emotional values, thus is perceptual and experiential and has “qualitative, fuzzy, metaphorical, emotional –holistic, not reductionist” personality (McCall 2004, p. 8). Rural knowledge is intimately related with natural resource management, heritage, and direct experience from dwelling in the landscape.

#### Participatory photo-mapping

As described by Müller & Wode (2002), participatory photo-mapping has many advantages: it allows local interpretation of land features, spatial visualisation of land and resources use, identification of environmental problems, spatial allocation of local knowledge, encourages group discussion, agreements and understandings for land

management and the production of an official document for further management. Participatory photo-mapping consists of the interpretation of a georeferenced image (aerial or satellite) by members of a community and the delineation of local spatial knowledge on transparent plastic sheets that work as layers of different classes of data. Information depicted is later transferred through digitising (Rambaldi et al. 2006; Müller & Wode 2002).

For this study, the Participatory Mapping methodology approach is used in order to portray different land uses in different time periods —past, present and future, and portray land use expectations through using satellite images and local participation. The desired products are community maps that integrate different perceptions that give a snapshot of the local reality and a representation of local expectations.

## Chapter 2: Mapping of expectations

---

### INTRODUCTION

**E**xpectations can be mapped. People expect different events –natural, social, economic, religious, etc.- to happen. It is a natural human behaviour based on experience: to anticipate, to speculate, to wish, to hope, to fear, positively or negatively. Everybody, maybe some more than others, has an idea of how things are going to be, or how they might result, or even how they surely won't occur. Such intuitions are often geographical: rough or naïve geographical knowledge<sup>18</sup>. Expectations are abstract thoughts produced by mixing past and present experiences. Phenomena can be natural, we can think, for example, of rain, fires, pests, flowering, frosts, and bird migration. All these are natural processes that, when shared in space with social groups, become known, appropriated and, in some cases, anticipated. But a phenomenon is also many times socially-influenced. If people start selling their land, migrating to other cities or countries, changing from growing maize to avocado, aiming to construct a supermarket, an airport or a soccer stadium, instead of preserving the forest and traditional rural activities, or vice-versa, these eventually become common and easily expected because they grow into a reality, something ordinary. Such knowledge – the expectations based on experience - is

---

<sup>18</sup> “...geographical knowledge of the individual and of society is based on personal geographies created from past recollections, present experiences and future expectations” (Lando 1996, p.3).



embedded in those who perform daily in a delimited space and it is essential for planning the landscape. Expectations are experiential knowledge that helps people prepare for the future.

It has been repeatedly affirmed that landscape is constantly changing, shaped by biophysical variability and human design. As previously asserted, land – landscape - is also a mental process. Social aspirations and expectations precede the material transformation of the landscape. Unlike other animals in nature, humans think before they operate. Adapting the Cartesian proposition *cogito ergo sum* to the dynamic between people and space, it could be transformed into *cogito ergo constituo* –I think, therefore I decide/arrange/settle-. Different possibilities are analysed - thought or imagined - from the craziest to the more suitable, in order to decide:

*“Space calls for action, and before action, the imagination is at work. It mows and ploughs. We should have to speak of the benefits of all these imaginary actions.”* (Bachelard [1957], 2013).

It is space, not in an abstract sense but as landscape, which somehow allures the imagination and eventually the actions that will have an inexorable effect of transformation. What Bachelard names as mowing and ploughing is actually a meditated analysis influenced by individual tastes and environmental possibilities, but also by expectations that limit the unlimited imagination. Thus, the Cartesian proposition can again be adapted into *exspecto ergo constituo* (I expect, therefore I decide the arrangement). Or, into: *exspecto ergo constituo ergo formo* (I expect, therefore I decide the arrangement; therefore I shape/give form). Furthermore, and continuing with Bachelard’s quote, acknowledging the countless fictional actions that take place in the space of the mind entails benefits — and also risks — that are commonly ignored in the LUP. This is supported by Yi-fu Tuan (1976) who encourages the humanists to look beyond the concordance between mind and behaviour that is commonly assumed and to try to depict the depth of beliefs, attitudes and concepts and the fickle relationships among imagination and action. By focusing only on the *exspecto* many imaginary actions emerge, thoughts that intimately relate ideas and feelings with place, and people with their environment. Such miscellaneous imaginary

actions will anticipate the possible shapes that the landscape can take, and thus provide important guidelines for PLUP.

Although not many examples can be found in land use studies of *landscape expectations*, the land use and landscape planning, landscape ecology, sustainable management, and conservation ecology agendas have worked very closely with future landscapes, with the concepts of *design of landscape values* (Zube 1987) and *natural resource management*. Zube et al. (1982) include future expectations in their framework for landscape perception, adding it to the human component, particularly to “the cognitive paradigm”, which “involves a search for human meanings associated with landscapes or landscape properties” (p. 8). In 2000, following the dialectical relationship between owning expectations and “buying” or adopting new ones based on lifestyles, Mitchell (2000) introduced shopping malls as landscapes of expectations, producers of capitalist lifestyles, where identity is produced and consumed<sup>19</sup>. Likewise, rural environments are affected by external stimuli regarding lifestyles and expectations. Dolman et al. (2001) applied a future scenario modelling using GIS and assessed different biodiversity conservation issues with local farmers. In Denmark, in 2003, Tress & Tress, proposed the inclusion of local stakeholders into future landscape planning in order to identify different interests for battling an increasing countryside urbanisation. The researchers, however, predesigned four possible scenarios to carry out their work; the main interest consisted of evaluating the effects of each scenario, rather than providing freedom of imagination for designing their own landscapes. Selman (2004) references some Scottish community woodlands studies concerned with an inter-generational dimension (past-present-future). As already asserted, thinking about the future is somehow guided and dependent on what people expect – desirably, realistically and pessimistically. In Tanzania in 2004, the international group Society for International Development (SID) gathered to discuss two questions: who are we? and, where are we going?, as a response to the fear and frustration that thinking about the future triggered. The strategy consisted of developing three possible different scenarios; one of no change; the second, named “Big thieves” in reference to the enrichment of only a

---

<sup>19</sup> “The mall-as-landscape is indeed quite accommodating: it not only sets our expectations, it fulfils them...” (p. 135).

minority; and lastly, an optimistic route centred on the strengths of their social network and the natural world. The project was called “Tutafika (we arrived): imagining our future” and addressed the importance of picturing future scenarios for being better prepared and organised. A final example, the Department of Geosciences and Natural Resource Management of the University of Copenhagen currently participates in thirteen projects called Landscape Futures focused on planning innovative solutions for the Danish countryside and integrating local citizens and stakeholders.

Expectations have an inherent imprecise nature; since they have not yet materialised, they are subject to change, and quite volatile. Building future scenarios requires a fuzzy approach. It is impossible to establish a correct limit to imagination on a future basis, it is even more difficult to draw precise -spatial or aspatial- boundaries about a possible change. Because the future is dynamic and hardly predictable, precision is irrelevant. Instead, flexible boundaries can be identified (McCall 2006). It is through ambiguity and laxness that agreements and, so, planning can be achieved. Future is nebulous, strategies chosen are fluid, adaptive, not strict; ideas, ambitions, life-styles and livelihoods change; nothing is granted. An outcome of thinking ahead is a broader willingness to negotiate, and prepare to expect changes. Aiming for sustainability involves making plans and strategies to shift development and uses towards a sustainable path, and responds to an expectation. But whose expectation?

### **EXPECTATIONS: NEEDS, DESIRES AND FEARS**

The future is part of everyone’s life. We all worry about something. We all crave something. And material stuff is allocated throughout the world in particular landscapes and in a limited way. Our desires and fears are geographical<sup>20</sup>. Not all of them materialise, but there certainly are possibilities that frame plausibility. Such thoughts are walled in by a set of realities located in a familiar place, not floating in thin air. The same place can be sheltering and threatening in different moments. Landscapes are furnished with positive and

---

<sup>20</sup> “Fear is in the mind but, except in pathological cases, has its origins in external circumstances that are truly threatening” (Tuan 2013, p.6)

undesirable expectations. People develop their expectations on a daily basis, thus are constantly changing with a personal history, and are influenced by others (Oettingen & Mayer 2002). However, nowadays places cannot be conceptualised as independent entities that operate exclusively under own norms and fashions, external and global forces also impact in what disempowered people ambitions. Such an idea was thoroughly analysed in the 90s by Doreen Massey (1993) in what she called *power-geometry*, which consists, essentially, in the acknowledgment that the world is a web of interconnected places where fluxes are originated and received differently, some places exercising as sources whereas others become “imprisoned” by lack of power. Accordingly, information does not travel reciprocally, and poor communities locate at the receiving-end. Likewise, expectations are also shared through connectivity and relationship to other places. Two decades before in his book “Por uma geografia nova”, Milton Santos rescued the concept of *derivative landscapes*, previously coined by Max Sorre to debunk the idea of the region as the sole interaction between man and its environment, by stating that:

“Such landscapes from underdeveloped countries, in fact, derivate from the economic needs of industrialized countries where decisions are lastly made”<sup>21</sup> (1990, p. 39).

Under these perspectives, ambitioning a same object would play differently depending on the social and economic position; although the same desire would reach very different places. Thus, expectations cannot be seen as fixed and framed by political boundaries and cultural heritage, but rather open and susceptible to powerful influences, many times standardised by strong economic muscles. Following Santos’ and Massey’s thinking it could be argued that weak communities’ expectations respond and are somewhat “imprisoned” by stronger more powerful peoples’ expectations nested far away.

Owning land in a rural environment under common property often includes a patch of forest, fields for agriculture and pasture and a natural water source that provide sustenance to satisfy basic needs; although some landscapes are more scarce than others and this should be carefully considered. Home, therefore, many times implies that basic needs can

---

<sup>21</sup> Translated from the Spanish version by present author.

be fulfilled at a very low or no cost. Rural livelihoods are natural and agricultural dependant, hence, the physical surroundings play a key role in expectations. Fuel, food, wood, medicinal plants and water can be “freely” collected; basic goods produced, land is constantly used and managed to meet local short and long-term needs. Moreover, land provides support for economic development and an income source; therefore, stability – sustainability? - of landscapes depends also on external demands for agricultural goods and space, and thus, population growth. More demand usually leads to an over-exploitation of natural resources and a loss of natural capital.

In some cases, people`s needs are sacrificed in order to fulfil a desire (Frankfurt 1984). It is important to differentiate between needs and desires, considering there is a grey zone that somehow unites them. *Needs* are indispensable things a person cannot live without, whereas *desires* are more superfluous and expendable, but not for that reason less important. Expectations are forged out of needs, desires, and fears.

Landscapes are also configured by different needs, desires and fears. By hosting humans, they consequently host their experiences, emotions and instincts, which frequently drive decisions. It is common to find oppositions between emotions, desires, and fears. It is a natural polarisation of positive and negative; the encounter can happen in the individual`s mind or in a social group. A mother might long for a school for her kids because she sees the lack of education as a threat or disadvantage. Another can see the same school as an external threat to traditional local meanings and values. There is a clear antagonism between what is convenient and inconvenient for different users. In real life, understanding decisions as good or bad is a narrow vision; rather they should be addressed as suitable and unsuitable for the majority. In many cases, the conflict is not fully discernible. In any society, the desires of one person can represent a threat to another. Chopping down a forest can be desirable for a furniture entrepreneur, and a catastrophe to a resin farmer. Conflict is a natural human situation in which opposite desires collide. In extreme cases, a strong selfish desire can stomp over a basic need. As in any kind of conflict, the winning side is usually the more powerful and resourceful. Mapping with the people can help by giving voice to the less articulate, less powerful, resource-weak, or disadvantaged.

Through interrogating expectations it is possible to identify personal or small group desires, needs, and fears. These three features actually live in the imaginational environment, but they owe their formation to previous experiences, a cultural heritage, and a surrounding current socio-cultural context. When an expectation is voiced, much information comes attached to it and can be analysed as a human phenomenon. To expect, is a reflection of personal memories, experiences and values all amassed into one complex opinion. Values are fluid and change in time because needs and desires are constantly changing, coping with reality (Zube 1987).

### **MAKING EXPECTATIONS VISIBLE**

It has been asserted that geography is inherently a visual discipline (Rose 2003). Humans are mainly visual animals (Tuan 1990). In the contemporary and trendy concept of landscape, sight is fundamental: it is an optical clip from reality, it seeks to link space with humans and it focuses mainly on the characteristics of human-space trade-offs and the consequential constructions that can be perceived through the eye (Cosgrove 2002). Geographical knowledge is, many times, produced by using visual materials and tools and is commonly portrayed, likewise, as visual products. Maps, the quintessential form of representation employed by geographers, are visual and meant to be read (Rose 2003). They are codified information in graphical language. Although not everything is innately visual (e.g. feelings, attachment, expectations), "...places can be made visible..." (Tuan 2014, p. 178). It is, therefore, important that expectations, which result from a human-environment experience, can be visible, visualised, and geographical, in order to prepare for change. Expectations can be located in space and mapped. They are responsive to uncertainty and they can be re-directed to address many plausible scenarios.

Geographical knowledge is essential for understanding and, afterwards, for planning the landscape. Local geographical knowledge, which has proven to be trustworthy, is of immense value to those external parties in charge of designing and administering policy instruments. Maps containing ordinary people's perceptions aim to diminish the communication breach between planners and local inhabitants.

By adding expectations to the mapping endeavour and, even more, to the land use planning pot, visualisation of knowledge, thoughts, desires, fears, and values becomes stimulated and communicated; local land use objectives become strengthened or rerouted; areas for conservation or development are located; agreements are placed in space. Mapping of expectations turns local experience and concerns into local geographical knowledge, and moreover, into visual media that are easily understandable by a broader base of people. A map of expectations is a tangible option to materialise the intangible; this is, the imaginary framed by plausibility.

Expectations are usually related to space (where?) and time (when?).

- I think A will happen “here” by “then”.
- I want A to happen “here” by “then”.
- I fear A will shock “here” by “then”.

Sketching land use expectations is possible through participatory mapping; likewise photo-mapping enables visualisation of local people’s geographical knowledge, feelings, perceptions, etc. (Müller & Wode 2002). There are many benefits of sketching of expectations: it generates internal dialogue and raises concern and awareness about future land use and future social organisation, it gives a general view of a locally-built future for further management and planning, and it shows a visual hierarchy of what is considered important and what is irrelevant. However, it should also be considered that, as information and knowledge become visual through drawing, much other information is excluded and tossed to invisibility (Rose 2003), so that all maps are in fact representations of an incomplete reality. People choose to display or keep information according to preferences and trust.

## **EXPECTATIONS: HAZARDS**

People who have lived in the same place for generations know and expect shocks to materialise. Particularly, rural communities that have a long history working and empirically understanding their territory are able to identify risks. In many cases, they have

strategies for dealing with these risks. Coping responds to an expectation of hazards built upon an accumulated knowledge of previous shocks. Such expectations can be spatially positioned, mapped, and used for Community Risk Management (CRM).

Hazards exist mainly due to a specific vulnerability and the capacity to cope with threats. Hazards are, therefore, dynamic, since resources and social organisation are not fixed in time, and vulnerability is also constantly changing after facing shocks. Vulnerability has received much attention from the social and natural sciences. In his wide review on vulnerability, Adger (2006) classifies three general topics where all studies meet: “These are the resources available to cope with exposure, the distribution of these resources (both social and natural) across the system, and the institutions that mediate resource use and coping strategies” (p.277). One thing is clear: community involvement is necessary to soften shocks. Since threats are localised and affect particular places, it is the inhabitants who experience phenomena directly who should be in charge of designing their own plans in communication with governmental entities. Institutional attention should be posed in the local scale in order to effectively reduce disasters. Mapping hazard expectations would give insight on potential threats, frequency and most vulnerable and safe locations.

One important issue rises from the experiential perspective of risk. Not everyone perceives risk in the same way, and takes on different meaning and value. An important difference between outsider and native’s worldviews emerge when planning for risks. As Álvarez-Gordillo (2011) argues:

“Taking on a subjective perspective, risk is a product of differentiated perceptions, different social representations, varying imaginaries that belong to different social groups; so that unlike a measurable objective category, risk is the product of the mental processes associated with the forms of existence, culture and the community’s life stories” (p.18).

Such miscellaneous imaginaries are not only the product of personal experience but built upon intersubjective experience and past recollections. Moreover, in landscapes where natural hazards happen on a frequent basis, people develop a strong relationship with the natural event which, in turn, is closely related with material loss and recovery. Special



attention should be placed in poor communities where vulnerability triggers an impassive attitude towards threats, turning them ordinary, invisible and dangerous (Álvarez-Gordillo 2011). Placing risk expectations on a map is a valuable alternative to translate such insiders' perceptions and knowledge to the outsiders. Also, discussing risk among groups of people can (de)normalise threats to raise awareness inside the community about potential danger. The elderly, who have experienced plenty of natural events and have traditional ways of measuring danger, are of key importance in the depiction of hazards expectations.

Hazards are not just hurricanes, tsunamis, earthquakes, droughts, and erupting volcanoes; social, economic, political, and emotional changes can also be destructive. Individuals and social groups depend on resources that are provided by nature, but are controlled by economic and political conditions. Likewise, economic activities are affected by factors of social stability (e.g. violence, health, migration, etc.), and emotional well-being (death, unhappiness, fatalism, contentment with life, etc.) and all should be considered when working for vulnerability reduction. Being vulnerable involves a collection of multiple vulnerabilities to different risks that cannot be disaggregated in real life. Planning for risk reduction should therefore be integrative and not exclusive.

- I expect A (hazard) will happen here, so I do S<sup>22</sup>.
- I expect A (natural hazard) + B (social hazard; e.g. violence) + C (economic hazard; e.g. inflation) + D (emotional hazard; e.g. disease of a family member), so I do S (e.g. buy robbery protection for house), and relinquish other responses, because I have X level of capacity/capital and Z level of governmental support to deal with shocks.

In social groups, individual instability can disturb a whole community, create conflict and disorganisation. Unlike ecosystems where a tree can fall down without creating great damage, a human life or individual decisions can trigger social chaos. The power of selfishness should be considered in landscape planning, since the natural human reaction when dealing with threats is to respond in a personal way: "It is essential for planners to

---

<sup>22</sup> S = Strategies developed with traditional and/or scientific knowledge in order to accomplish a desired aspiration or to tackle a threat.

realize that people will react to threats to environments to which they are personally attached in the same way they will react to threats to their personal ways of life; indeed, they are inseparable” (Zube & Sell 1986, p.168). Reason is simple: landscape is part of people’s life.

In the CRM framework plenty of training materials have been developed in order to provide guidelines to assess risk, vulnerability, local capacities and to plan for a safer future. Enhancing the local capacities to effectively prevent and reduce loss is recognised to be a key issue in the Peruvian book “Gestión Comunitaria de Riesgos” (2002) published by Foro Ciudades para la Vida. Participatory products, such as maps, are of great relevance to encourage dialogue inside the communities, prepare for the future and increase social organisation. Likewise, expectations should provide important insight on risk management and vulnerability reduction.

## **MAPPING SCENARIOS OF LANDSCAPES**

Mapping scenarios is creating stories about the future and how specific elements of the world might be in the future (Wollenberg et al. 2000) - or, how people think the world will look. To that effect, they are geographical stories. Stories always happen in a place and a time, and, therefore, can be mapped. Scenarios are mappable. It is not about predicting, nor reading crystal balls or coffee grounds. Rather, they are cartographic narratives for envisioning different possibilities, wished or unwanted, desired or feared, destructive or constructive, that help diminish uncertainty, prepare and allocate resources in the most efficient way (Searce et al. 2004), because we live in a dynamic and uncertain world. And, moreover, we, people, are also uncertain, unpredictable, and fuzzy creatures. Uncertainty is a natural situation with which we coexist. What lies ahead? What changes? What endures? We all plan our lives based on expectations and through the anticipation, preparation, and identification of possible effects, whether they are positive or negative, bearable or unbearable.

But, important is: who is telling the story?

Many stories can be told, many scenarios drawn. Landscapes are inhabited by polyphony. Everyone think about the future, but not everyone thinks the same way. People are constantly exposed to different stimuli and events. Many livelihoods coexist in the same territory. Perceptions vary from one person to another and, consequently, their expectations. Many storytellers can be found in the same place. Participatory mapping scenarios help encourage thinking ahead jointly through community exchange, and producing group information. Diversity supports the distinguishing of alternative visions on hazards, wishes, worries, vulnerabilities, values, knowledge, opportunities, etc. Complementarily, participatory scenarios aim to develop common frameworks and agreements (SID, 2004), so that planning trumps individuality and becomes communal.

Scenarios are crafted with the objective of being used by different stakeholders, including planners, decision makers<sup>23</sup> and any community member interested in assessing options. Two types of characters may interact with the products: crafters and readers. The first type - crafters, people that actively participate in the scenario-sculpting, are drawn to a mental order in which everything can potentially change. Perception of a specific place reality is activated by expectation and anticipation.

The research in this thesis aims to portray community scenarios about people`s expectations for the uses of their land. What changes are expected? What stays without change? People`s expectations about land use should complement land cover change projections and be used for landscape planning and to represent local knowledge, opinions, fears, and interests.

## **PLANNING WITH EXPECTATIONS**

Expectations can be used as a foundation stone for planning. They work as inputs for an exploratory phase to identify the aspirations, interests, intentions, threats, fears, and main issues a community is currently facing. Wishfulness and willingness to change or preserve

---

<sup>23</sup> “Decision-makers use them to evaluate what to do now, based on different possible futures” (Wollenberg et al. 2000, p. 66). In community land use management, two levels of decision-makers should be recognized: those within the community who have direct impact on changeability and transformation, and those outside the community who indirectly frame the possibilities of those within – e.g. policy-makers.

the *status quo* of the landscape give essential information about how it would most likely be in the future. Options to change, or to preserve, are future purposes that call for planning. In the core of every plan or strategy there are hidden desires that emerge as expectations. If what is expected to come is negative, efforts to avoid such a situation will be made. If, on the contrary, the expected situation is perceived as positive, strategies to successfully achieve that scenario will develop. Expectations vary according to particular social groups' ambitions, and many will be found in the same landscape.

“...people perceive and evaluate natural resource management according to how the social group with which they identify assigns expectations of, and meanings to, the place in question” (Cheng et al. 2003, p. 97)

Local land use expectations are thus diverse, dynamic, and complex. Adding expectations to the PLUP on a spatial basis allows communities to identify vulnerable and priority areas to guide local development in a more sustainable way. P-mapping helps the people to visualise, discuss, and locate areas that have the potential to change. Negative expectations can therefore be assessed by the community and can lead to the development of alternative more positive strategies. On the other hand, positive expectations help detect what is good for the community and for areas with potential, and likewise, build on strategies to achieve such scenarios. People in rural areas use and manage their land, and therefore, consciously or unconsciously, plan the use of land (Amler et al. 1999). However, what is understood for PLUP is more of a political concept of sustainable rural development that seeks to improve conditions through interaction between local farmers and outside institutions. PLUP also aims to ameliorate local resource conflicts, reduce negative effects on ecosystems, and to build long-term agreements (Tan-Kim-Yong 1992).

# Chapter 3: Nieves, Tumbisca & Laurelito

(Land use expectations: mapping different views)

---

## INTRODUCTION

**P**articipatory mapping is an efficient tool for PLUP (IFAD, 2009; Chambers, 2006; McCall & Minang, 2005). It allows people to discuss and represent spatial information, knowledge, beliefs, needs, etc. (IFAD, 2009; Alcorn, 2000) through a visual and universal language: maps (Corbett & Keller 2004). Everybody has knowledge of the place they inhabit because they use and manage it every day. Local people are, therefore, experts of their environment. They have detailed understanding of the landscape they use. Thus, active users of the land should be included and recognised as specialists in landscape management activities (Campos et al. 2012). The P-mapping methodology meets the requirements of this research because it offers a spatial platform where people can draw lines, e.g. boundaries, or areas e.g. land uses, and describe spatial relationships, interpretations, values, and/or perceptions of their environment (Herlihy & Knapp 2003).

## METHODOLOGY, METHODS AND TOOLS

In participatory mapping local members identify and record community perceptions, information and values onto aerial or satellite imagery. Many kinds of information can fit,

everything that emerges from the human-space relationship: human (cultural) experiences placed in the landscape. For the present study, participants were asked to recognise and depict different information regarding land use: changes and expectations represented in forms of polygons (e.g. agriculture), points (e.g. springs) and/or lines (e.g. roads). Each element was linked to a description about land usability or changes related to land use. In the first map -scenario-, participants represented the present use of the landscape; secondly, past uses; and thirdly, future expectations with three possible outcomes: “realistic”, “ideal”, and “feared”.

During the workshops questions were posed in order to encourage dialogue and to pull more information to the surface. After drawing an example the activity was mostly free, just guided by general questions. Questions were very useful as guidelines but also as a mechanism for stimulating the quiet or non-interested participants.

## **Preparation**

First of all, it is essential to meet the community. Most people are shy and reluctant when it comes to working with strangers, and, even more, if they are expected to participate in an activity. If trustful answers are intended, building trust is highly important. In this study, the three chosen localities were selected because other university projects are being developed there, and therefore people have previous experience participating in social research and some even in P-mapping. Meeting the community involves meeting different people but it also means walking around, talking, hearing, observing, smelling, and visiting important places. GPS points or tracks of important landmarks for the community can be recorded for facilitating later spatial reference when working with the image.

### Calling for participants

Local meetings with inhabitants are a good opportunity to present the project and invite people to join. However, some communities might gather with less frequency than others, thus slowing the process. Another option is to talk to the leaders and/or key informants and ask them to summon participants. In isolated communities with no phone lines, many trips are needed in order for participants to show up to the workshop. When working with

different groups (e.g. gender or age), it is important to specify what kind of participants are needed to avoid wasting the time of other members. Working with the children can be rather easy if there's a school in the community. Rural teachers, since they are aware of the isolation in which rural communities develop, are usually excited about the idea of having external people sharing information, knowledge and activities.

### Framing the area

Many sources for obtaining free satellite images can be accessed nowadays. Orthophotos are also recommended (Müller & Wode 2002). Freeware is important because it means participants can later access the source of the raw information and, if desired, reproduce the exercise by themselves. In this case the images were cropped from Google Earth Pro, which is free and allows downloading high resolution images (4800x2905 px). A polygon in .KMZ format with the territory boundaries made by the National Agrarian Record (Registro Agrario Nacional, RAN) was used to frame the area. The scale of the image depended on the size of the territory. For the case of Tumbisca, the area was fragmented into three separate images so that land cover could be recognized and classified due to the vast size of the territory. Scale varied from 1:25,000 (Laurelito) to 1:50,000 (Nieves and Tumbisca). The images were georeferenced using GIS software. Images were printed in 60x90 cm sizes for the P-mapping activity.

### Materials

- **Transparent layers:** Acetate sheets were used to work as layers, covering the image and changing to a fresh one for each scenario (present, past, future). Sheets were labelled by name, date and place and the corners marked for further overlap.
- **Markers:** Sufficient permanent markers are needed so that all participants can draw the map. At first, participants are normally shy and nervous, so encouragement to grab the markers and dissipate the fear of mistakes is needed.

### Pilot test

In order to test the methodology, a trial session was developed. Children from the secondary school of Nieves were chosen due to the teacher's openness to participate and were divided by gender. Only a future scenario was drawn, not restricted to real, ideal or feared. Boys transformed the whole rural landscape to a city with an airport, a football

stadium, gas stations and residential areas, amongst other typical urban establishments. Girls were more realistic and showed some expected future changes in the augmentation of some crops or the reduction of forest. Giving complete freedom turned out to be counterproductive since seriousness was lost, replaced by playfulness. Such information, however, actually provides a picture of the general ambitions and wishes craved by young generations who are more exposed and influenced by the city of Morelia. For the present study, an unframed imagination was not desired since it escapes plausibility. In order to reduce unrealism we decided to form mixed groups and guide the mapping by asking for specific scenarios.

### **The mapping**

A short explanation of the activity was required to describe the type of image they were going to work with, how it was taken, the year of the image, the main objective, and what they are expected to do. The facilitator should be prepared to work with one or more groups. Sometimes people are not attracted to join and number of participants is low. But it can happen the other way around so enough material should be available. Groups of more than 5 people start to be messy and easily distracted. In order to guide the activity a script was previously written (see Annex 1).

#### Before drawing

An easy way to have connections between the information marked on the image and the oral information is by numbering the polygons. Before starting to draw a few minutes are used to identify landmarks (roads, rivers, mountains, etc.) and places of reference so that participants can locate themselves in the area. Some people locate features easily and quicker whilst others take more time to get familiar with the image.

#### Voice records

Not everything gets marked on the map. Much information is voiced. It is a good idea to have a voice record of everything discussed and verbalised during the mapping session for further reference and for filling gaps of information. Also, the recording can be used to analyse the oral information and categorize it.



### Present map

The first map involved drawing the actual current land uses, led by questions such as: *What are the main economic activities here? Where do you grow/collect/go/graze ...? Are there special places you visit for leisure/spiritual/aesthetic reasons?*

### Past map

The second map asked the participants to make a journey to the past, approximately ten years, to reveal their perceptions of land use changes. Questions asked: *Do you continue doing the same activities, in this place, that were being done 10 years ago? What has changed? Where have the changes occurred?*

### Future maps

After describing the present and travelling to the past through memory, the activity changed the mental environment to that of imagination, of plausibility, where expectations breathe. In the fieldwork, we tried to make three future scenarios (for ten years ahead), however the last two, “ideal” and “feared”, had to be merged into the same layer because at that point participants showed tiredness and boredom. Using two different colours, one for “ideal” and another for “feared” sufficed to solve this problem. For the first future scenario, participants were asked to think about a realistic scenario, something plausible that, considering their experience and their memory, the changes and trends, they think could happen. *What is going to change/happen... and where? Why do you think that is going to happen? Do you feel those changes would be positive or negative?* Finally, the last layer of positive/negative looked to answer questions such as: *How would you like your landscape to be? What changes do you think could benefit the community? What land uses would be good for you?* Information from the future realistic scenario served to refine particular questions about desires and fears regarding current land uses and expected changes.

## **Information processing**

### Digitalisation

The information marked on acetates was transcribed to a digital geo-referenced format using GIS software. The advantage of sketching on satellite images is that information and

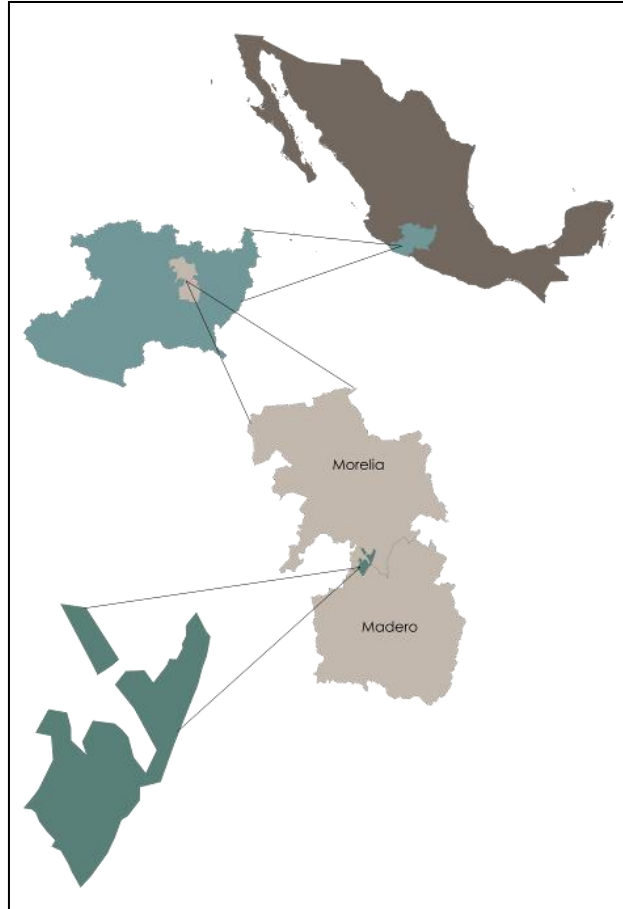
knowledge drawn are geo-referenced and can be overlapped with other geographic layers (territory boundaries, rivers, roads, soils, etc.) and shown as formal maps. ArcGIS 10.2 was used to digitize polygons and overlap group layers to produce the community maps. The *topology* tool helped to verify errors of gaps and overlaps between polygons. Other tools that were used are: *Clip, Reshape feature, Align edge and Merge* (layers and polygons).

#### Data aggregation

Although we are aware that groups of people are heterogeneous in themselves, we decided to treat them as homogeneous, as the original intention was to compare between groups of people differentiated by gender and age, and not inside groups. Thus, information was aggregated in GIS for similar groups who were divided in the field only for practical organisational reasons. To do that, the polygons can be transformed and increased or merged. Moreover, community maps aggregate different information and combine repetitive information. In case of any discrepancy of information between the past and present maps, amongst the groups, verification was done using Google Earth's image history.

## NIEVES

Nieves is a cool windy ejido (944.5 ha) with pine scents located south of Morelia city; coordinates 19°29'01" North and 101°14'43" West. Freshness of the place is due to a 2238 m.a.s.l. altitude and a Cw2 (temperate sub-humid with summer rains) climate (García, E. 1998). The village, with 91 houses that host 170 men and 162 women, is surrounded by croplands dominated by maize; some mixed with oats, barley, beans, squash or wheat. Agriculture is mainly seasonal due to frost in the dry season. Mountains are wrapped with a dense pine canopy sprinkled with oaks and hawthorns. However, this messy arboreal tapestry is



patched with avocado orchards. Vegetation rests on a bed of dystric andosol and dystric luvisol soils (INEGI n.d.[b]). Human presence is highly perceptible and visible through material scars and fragmentation of the landscape that reflect social realities. Forest is apparently the most valued landscape unit, or *monte* as they name it, which is a more accurate concept since it represents a complex system —landscape— where many social activities happen: trees are superficially incised for resin extraction, firewood and timber are gathered from fallen trees and branches, sick trees and old trees for fuel and wood, new juvenile trees are planted to replace those that were removed, mushrooms and berries are collected, cattle are taken for grazing, and some *milpas* are settled. Such a diversity of activities handled by the people can be generalized by using a local word: *campesino*<sup>24</sup>;

<sup>24</sup> Klooster (2003) describes *campesinos* as “mexican rural dwellers who make their living through a diverse portfolio of agriculture, forest extraction, craft production, wage labour, remittances, and petty commerce”.

referring to a person who works in agriculture, livestock and forestry combined, in the *monte*. This complex *campesino* livelihood makes land use a very diverse matter and impossible to understand and define just by interpreting land covers through remote sensing. The people who manage their landscape are essential for classifying and understanding the use of space. Land property is distributed amongst 65 *ejidatarios*, 19 *posesionarios* and 1 *avecindado*<sup>25</sup>. People in Nieves face different problems that are highly associated with rural poverty and the inefficiency of government projects that fail to support and promote rural activities. Such problems impact on people's livelihoods, hence, on the local landscape.

The landscape of Nieves can easily be classified in three main land uses: *monte*, field agriculture, and avocado production. Avocado orchards represent one of the main problems for the community. The President and Secretary of the *ejido* fear heavily that their territory will continue to change due to the sales of lands to outsiders who do not share the same values and wishes, especially those values associated with the maintenance of the forest and maize growing, but who, on the contrary, seek individual profit only. Avocado may be good for work, it means money, say the women, but it demands a lot of water, it's mainly owned by outsiders, and it uses harmful insecticides that hurt the community.

Activities and usages extend beyond the political limits of the *ejido*. In the mapping exercise, for the women and the young, spatial boundaries are neither clear nor discernible. In fact, the political spatial limits and the people's range of uses of the land do not overlap. Men, for example, move to neighbouring lands to work in avocado and blueberry orchards. People's activities have a broader footprint since they are involved in activities such as: gathering of non-timber forest products, fishing, cattle grazing, and paid work in outsiders' orchards -these require mobility to distant specific places to cover specific needs. In the

---

Such description is wider and accurate for a generalisation. Nevertheless, not all *campesinos* develop the same activities and not necessarily all of the possibilities; some may be limited to only one or two activities whereas others might be more multifaceted.

<sup>25</sup> As defined by INEGI (n.d.[c]), *ejidatarios* are all "men and women holding *ejido* rights, recognised as such by the Ejidal Assembly"; *posesionarios* are "members of the *ejido* that benefit from ejidal lands, parceled or of common use, but has not yet been recognised as an *ejidatario* by the Assembly. They can reach ownership of rights on an individual plot by recognition of the Assembly", and *avecindados* are "all those over 18 years old who have lived for one or more years in the lands of *ejido* or agrarian community and are recognised as such by the Assembly".

mapping exercises, men showed a high level of recognition of boundaries, guided by roads, houses of members of the ejido, and agricultural plots. As opposed to the young and women, men only draw polygons for areas they recognized as theirs; actually missing some areas that also belong to the ejido. The perception of men's space, as represented, is narrower, more precise, and more accurate in terms of those activities held within the *ejido* limits. As a result, they only marked specific places they continuously visit and which definitely belong to them.

A total of four mapping sessions were conducted in the *ejido* of Nieves. The local authorities showed interest and openness in the project and helped to communicate the activity to amongst other land owners. All the workshops followed the same general outline. Facilitators received the same script to conduct the activity. The group of men and key informants –also constituted by men-, showed the same trouble: a generalized hesitation to draw lines on the image. However, they felt free to speak their minds, and as a result they only produced two maps. The women and the young, on the contrary, had no problem making all of the maps.

| Group          | No. of workshops | No. of participants |
|----------------|------------------|---------------------|
| Key Informants | 1                | 2                   |
| Men            | 1                | 4*                  |
| Women          | 1                | 7                   |
| Youngsters     | (1 pilot)        | 10                  |
|                | 1 official       | 12                  |
| <b>Total</b>   | 4                | 23                  |

\*The two key informants also participated in the men's workshop due to the low participation of other male members from the community. This, plus the exclusion of the pilot participants, who are not included in this research, explains why the total number of participants is 23 and not 35.

## Women

Every Thursday women gather at the secondary school for exercise activities. This means plenty of women from a diverse range of ages clustered in one place at the same time. Such a reunion facilitated the exposition of the project to a diverse group regardless of age and

occupation, and the consequent invitation to participate in the P-mapping activity. Seven women signed up to participate. Presentation of the printed image helped draw their attention. They had never seen one before. At first they showed a sceptical and shy attitude but it was soon replaced by curiosity. A first reaction to something strange is naturally that of rejection and hesitation, so encouragement is required. A symbolic monetary retribution was offered both to ensure their participation and as an exchange or compensation for the time they were willing to provide us.

The mapping session took place in the *Casa Ejidal* —Community Government House—, which is also used as classroom for the secondary school, and demonstrates, in itself, the lack of infrastructure. Women were divided in two groups in order to avoid chaos. Two maps for each scenario were produced. The information was then aggregated when digitizing into GIS. Women contributed with information for crafting five final maps (Maps 1, 2, 3, 4 and 5) that give a more detailed understanding about the local land use reality of their *ejido* and future expectations, including desires and fears.

In general, participants showed interest in the activity and shared their individual knowledge about the usability of the land based on their experience<sup>26</sup>. At first, it took them some time to locate landmarks in the image and to understand the distribution of the features. To some extent, this is attributable to the mediator's otherness and lack of knowledge of the place, and failure to record local landmarks in advance. Also, in the beginning, participants were shy to draw on the image; though they gained confidence during the activity and, in the end, surpassed the objectives. Plenty of information was recorded, both spatial and oral.

In both women's groups voices were recorded using mobile phones and then transferred to the computer for cursory analysis. Although transcriptions were not made, relevant oral information was associated to land use units classified in the workshops for each scenario.

---

<sup>26</sup> Experience can be of two kinds: direct, as an active user; or passive, as a community member that knows about other people's doings. Women, for example, although they spend most of the time doing house activities, also hear and learn about the local reality from their husbands, family and friends.

| <b>Table 2. MAPPING SYNTHESIS<br/>(Maps 1 to 5)</b> |                     |                        |                          |   |   |
|---|---------------------|------------------------|--------------------------|---|---|
|   | <b>Past</b>         | <b>Present</b>         | <b>Future continuity</b> | <b>Future desire</b>                      | <b>Future horror</b>                                |
| Land use classes (N°)                               | 10                  | 13                     | 11                       | 12  | 6   |
| Total N° polygons                                   | 20                  | 18                     | 19                       | 14  | 9   |
| Mode  | NTFP extraction (4) | Avocado production (4) | Avocado production (6)   | <i>Monte</i> and Blueberry production (2) | Deforestation, avocado production & desiccation (2) |
| Largest   | NTFP extraction     | Ejido (agriculture)    | <i>Monte</i>             | Maize, beans and squash sowing            | Deforestation                                       |

As Table 2 shows, in a broad sense, the past is remembered as a forest landscape where people used to collect NTFP in a wider area. Both the number of polygons and the size of the area suggest a forest livelihood. Main losses (see Table 3) are related to reduction of NTFP availability, forest area and leisure areas, all affected by the establishment of avocado orchards. The present land use map shows a change in perception regarding the dominant use: avocado production and agriculture. Coupled with oral information, avocado is said to be “new” and “owned by outsiders”. If the dynamics of land use change continues in the same course, more avocado orchards are expected to come. The desired landscape is of a diversity of activities based on forest management and agriculture, orchards included but not predominant. Paid work in blueberry orchards is also a strong desire, since it offers an alternative income countering low profitability of land, the dry season, or non-ownership of land. Finally, a negative scenario represented as a landscape of horror, shows that deforestation, avocado orchards expansion, and desiccation are the most feared changes.

| <b>Table 3. WOMEN'S LAND USE PERCEPTIONS</b> |                    |                             |   |
|--|--------------------|-----------------------------|---|
|  | <b>Land use</b>    | <b>Positive perceptions</b> | <b>Negative perceptions</b>                         |
| <b>Present</b>                               | Avocado production |                             | “Here most of the orchards are owned by outsiders.” |

|   |                        |  |   |
|---|------------------------|--|---|
| <b>use</b>  | Agriculture            |  | “Nothing grows in the dry season because it frosts”.  |
| <b>Past use</b>   | Avocado production     |  | “All orchards are new.”   |
|   | Wild berries gathering |  | “There were plenty of wild berry shrubs but not anymore. They cut the shrubs to put the avocado orchards”                             |
|   | <i>Monte</i>           |  | “There was plenty of <i>monte</i> , now it is nearly gone.”   |
|   | Leisure                |  | “People used to go to La Peña... on picnics. Now it is an orchard owned by strangers and nobody goes anymore”.                        |
|   | Dam                    |  | “Long ago there was a dam, but it broke and now there’s only the river”.  |
| <b>Future continuance use</b>                             | Avocado production     |  | “Avocado orchards will continue to exist. New ones will come.”  |
|   | Agriculture            | “Agriculture will continue. There’s no way people will stop sowing.<br><br>Oat fields will continue because it’s too humid to try something else.” |   |
|   | Fishing                | “Fishing is an important income source and will continue.”   |   |
| <b>Future desire (positive) and horror (negative) use</b> | Avocado production     | “The best would be not to have any avocado orchards. Although it is a source of employment for men.”   | “Avocado trees don’t let water infiltrate... and insecticides used harm us. The air brings bad smells and diseases to the community”. |
|   | <i>Monte</i>           | “More <i>monte</i> because it looks pretty with the trees... and more wild berries and hawthorns so that water doesn’t become scarce.”             | Deforestation.  |
|   | Agriculture            |  | “If agriculture stops”  |



|  |                      |  |                                  |
|--|----------------------|--|----------------------------------|
|  | Blueberry production | “More, to have work all year long.”  |                                  |
|  | Settlement           | “Bigger settlement... more employment... better schools... so that people don’t migrate to the U.S.A.” | Migration and selling of land.   |
|  | Roads                | “Paved roads. Public transport”.   | “If roads continue as they are”. |
|  | River                |  | “If the river dries”.            |

\*These perceptions were extracted from the voice records.

### Methodological conclusions

- At first, when summoned, women were shy and reluctant, but during the mapping workshop they were very participative and enthusiastic and drew all of the maps. A lot of information was depicted.
- Women were able to identify different land uses for different time periods (past and present) and to design future scenarios based on different expectations (future continuity, future desired and future horror). This level of depth of information is impossible to get just by classifying land cover.
- Leadership fluctuated between the most enthusiastic, and the eldest.
- Women drew plenty of polygons, some of which do not fall inside the ejido political limits, because their outside activities do not have strict limits and go beyond the ejido boundaries e.g. collecting NTIPs and hiking. We believe this may be for two reasons: 1) lack of spatial knowledge in terms of political limits, and 2) less weight or no concern for drawing boundaries for land that does not belong to them.
- Women are very organised and do different group activities, such as baking sweet bread, playing sports and helping in the school kitchen. We believe this helped the group-based activity to be successful.

### Findings conclusions

Although environmental issues were detected and they related mainly to avocado orchards, socio-economic deficiencies (roads, phone line, school, etc.) dominated and overshadowed everything else. It is a highly marginalised community. It makes sense to prioritise the more salient issues first. Even avocado orchards, which are associated with negative impacts on their community, represent a sort of benefit since they are sources of employment. Blueberry orchards, which are also owned by outsiders, give work to the people all year long, and are perceived as beneficial and are desired as a source of income.

The main realistic expectation is that avocado orchards will continue to spread in the territory (see Map 3). But also that forest management and agriculture will continue: “there’s no way people will stop sowing”. There is a big polygon of forest which is represented under tourism use, and is explained by the gossip that a man is considering building some cabins. Tourism is an important activity in the neighbouring community of Umécuaro, where people from the city spend the weekend seeking the silence and peace of natural environments. Thus, ecotourism could be an opportunity to enrich the profitability of the forest. However, other tourism issues should be considered.

The desired landscape is a more diverse mosaic of land uses. Sowing of maize, beans and squash is the biggest land use area depicted, and conveys the idea that traditional agriculture is still valued. Monte, as the complex unit incorporating timber and NTFPs, aesthetics values and ecological services such as clean air and water, is also important. Paved roads, which are signs of economic growth, also appear as a recurring desire.

The “horror” landscape is dry and wiped out by deforestation for the establishment of large areas destined to avocado production. Ecological and health issues are identified as related to avocado trees, particularly affecting water infiltration and pollution caused by insecticides. Amongst their fears is also the loss of land to outsiders, migration of local people, deforestation, and economic backwardness. They relate the population size of the community with economic development and feel that losing people results in less economic growth.

Women are optimistic and even though they believe hostile changes will happen they still see economic opportunity in blueberry production, to name an example. Since the production cycle of blueberry covers the whole year, it is a good job opportunity for farmers who depend on rain-fed agriculture. In spite of this, women trust that agriculture will continue as a main local activity. Also, they identify the improvement of schools as a leading factor that can bring positive change to the community.

## **Men**

Only a few men were willing to participate in the mapping activity (four participants), and those who composed the small group were highly reluctant, sceptical and cautious. Men are mostly busy working in agriculture, in the forest, in neighbouring avocado and blueberry orchards or even living in the city of Morelia, making it difficult to persuade them to participate in an activity that does not offer an immediate return. Such an attitude is understandable, especially since the level of marginalisation is high (CONAPO, 2010), thus energy is destined towards activities that generate short-term benefits –money, food, fuel, etc.- and not to developing long-term strategies. Spending time mapping for outsiders' data collection seems to be a luxury. Planning long-term land use appears to be also a luxury in communities that survive on a daily basis. Social disorganisation, furthermore, is a driver that affects participation. Apparently land owners are divided into two major groups with ideological differences: those who believe in conservation of the forest and of traditional agriculture, and those that seek economic progress and enrichment despite land cover change or even selling of their land. The men who participated in this research belong to the first group. The information collected is therefore highly slanted towards one view. It is not surprising to find strong rejection of avocado and concern for preserving the forest.

Despite the initial willingness to participate, two participants showed apathy, scepticism and boredom during the mapping workshop, which eventually spread out among the rest of the participants. Unlike with the women, the first map (present uses) took almost one hour to sketch. The delay was due to the hesitation to draw on the image and the recurrent requests for the intermediary's help concerning land sales and avocado orchards expansion.

The session was aimed to last around one to one and a half hours. Due to this issue, the mapping of the rest of the scenarios (past uses, future ideal, and future unwanted) was sacrificed, though we attempted to collect the information orally. Although they were constantly encouraged to draw on the map, the men were very reluctant and generated just a few polygons. Furthermore, the responsibility of drawing (holding the marker) was delegated to one of the men who seemed to recognize landmarks easily. The rest of the group collaborated with new ideas or discussed the accuracy of the limits drawn. No further mapping session was scheduled, since there was neither motivation nor interest from the participants. Constantly they called for help to stop avocado growing from spreading. Such an attitude shows that a strong conflict exists between two antagonistic groups. If land sales occur, it means a majority of the Assembly support this motion.

Locating and drawing on the image were very time consuming, however, the accuracy of the polygons depicted is significant. The seven polygons drawn are enclosed by the *ejido* limits, and the areas perfectly recognised as theirs (Map 6). Agriculture areas are shifted annually, one year for sowing crops, and the next for livestock grazing. The biggest polygon classified as “maize, bean, squash and barley sowing” is said to be an area protected by the climate. During the dry season that particular area has frost in the mornings, making it unsuitable for avocado growing. This, however, should be considered as a potential susceptibility towards climate change. Variability in the local climate with the potential to heat up the environment could break the natural shield, and increase local vulnerability.

There are two main changes detected in terms of land use, establishment of avocado orchards and efforts of forest conservation and reforestation. The former has had an impact on leisure activities, blocking the way to aesthetic places where people used to have picnics and spend the weekends. Fences also block the way for those who collect NTFP. The main land cover changes from forest or agriculture to avocado orchards are located in the high parts of the landscape. In the future they expect many changes because they know people are selling their land to avocado producers. Forest areas and *milpas* will then change to avocado orchards. In terms of forest conservation, trees –mostly pines- have been planted in areas without vegetation and they look forward to continue to reforest through

governmental programmes. Interestingly, they mention the absence of social cohesion and cooperation in community projects as a main issue to change for a better scenario. In general, they expect their situation to worsen.

Although completing all the maps was not possible because of time constraints, voice records helped to complement and enrich the story for this group, especially for future expectations, desires and fears.

**Table 4. MEN'S LAND USE PERCEPTIONS**

|                               | <b>Land use</b>    | <b>Positive perceptions</b>  | <b>Negative perceptions</b>  |
|-------------------------------|--------------------|--|--|
| <b>Present use</b>            | Oats               | “It doesn’t need water nor anything, just sowing the oats”                                       |  |
|                               | <i>Monte</i>       | “We have planted trees, collect firewood and extract some wood annually with a permit for sale”. | People that used to go to collect NTFP for sale no longer go. They just stopped going. “Only one man keeps coming to gather a bucket. He is from the community but lives in Morelia”.  |
|                               | Avocado production |  | “Land is being sold to establish avocado orchards”   |
| <b>Past use</b>               | Leisure            |  | “We used to go to La Peña, but now we can’t”. They stopped because an avocado orchard fence blocked the way. “Now there are some lands we cannot cross”. “Now, when people have more time, they go to the lagoon in Umécuaro”. |
| <b>Future continuance use</b> | Avocado production |  | “It won’t look the same because it is already changing a lot, there, in the top, it has now changed to orchards”<br>“The top parts have already been sold to establish orchards”.  |
|                               | Agriculture        | Agriculture and lowlands are safe from   | “ <i>Milpa</i> will stop and change to orchards”   |

|   |                   |   |  |
|---|-------------------|---|--|
|   |                   | changing to orchards due to frost and low temperatures. They could only change to pine forest.  |  |
|   | Forest            | Reforestation with government programmes. “Some areas that had no trees will have pines”. They look forward to preserve the forest, so they believe they will continue to do forest related activities. |  |
|   | General landscape |   | “We would like it to improve, but what we see is that it is worsening”. “Maybe because of lack of employment or internal disorganisation”. |
| <b>Future desire (positive) and horror (negative) use</b> | Locality          | “To have many basic services that we don’t have”. “To have job opportunities”.<br>“Improve infrastructure: rehabilitate dam and roads”.   |  |
|   | Agriculture       | “To have equipment to work the land more efficiently”.  |  |
|   | Community         |   | “There’s a lack of social cohesion that affects the organisation of communal activities” for a better future.                              |

\*These perceptions were extracted from the voice records.

### Methodological conclusions

From the beginning the workshop was hard to schedule for different reasons affecting participation. Among the main factors to explain the low attendance are: 1) a general lack of interest in the activity; 2) local time constraints, because they might have had better things to do; 3) external time constraints, because more time might be needed to build trust and develop more locally owned projects; 4) conflicts and divergent interests over land use between two polarized groups; and 5) failure to encourage participation, since we were not able to make our objective attractive enough to the local interests.

Boundaries can mean a lot to landholders. Drawing and enclosing spatial information regarding land use can be a sensitive matter for those who know in detail the distribution of land. It is possible that the participants refrain from representing –or fear to misrepresent- a wider reality. Since land ownership in Mexican *ejidos* is paramount, the official land register map is well known by all landholders, and the boundary plays a crucial role. Making land use maps –and especially future land use maps- can be a difficult task in territories under social community property.

If landmarks had been recorded in advance with the participants, locating areas and features in the image would have been easier and less time-consuming. Particularly, La Peña –a mountain form due to a fracture - was mentioned as an important landmark for spatial location.

#### Findings conclusions

Forest areas are highly valued and, although they are classified in terms of NTFP use as being the main activity, other uses take place in the same space. Small *milpas* are settled in the forest near the trees assigned for resin extraction in order to save time in walking. Also, cattle are taken into the mountains and benefit from natural pasture. During the sowing season, the children help in the tasks, and learn and share the activity, turning it into a family time. Forest use, then, is complex and manifold.

Currently, the community is facing strong changes related to external, more global forces, among which land sales for avocado production is the main one. The local reality is affected in terms of forest loss, pollution, obstruction of old paths, social disorganisation and loss of traditional values. Land expansion and high profitability of avocado in the region leads people with financial capital to seek the more suitable lands for avocado growing to increase production. Nieves is currently undergoing this external pressure, in which landowners receive attractive deals for their land, amounts they would hardly earn through traditional agriculture and forest management. Those who resist selling have other values which they attach to the forest and to agriculture –*milpa*- that should be examined in

greater depth. Strong cultural values to natural settings are of great importance when aiming for sustainable futures and ecological conservation.

## Youngsters

The workshop with the children took place in the same room as that with men and women, which is used both as classroom and *Casa Ejidal*. The meeting was previously scheduled with the teacher, who showed great openness, flexibility and enthusiasm about having people from outside the *ejido* share new things with the students. Twelve children participated and were divided in two groups of six each. To locate themselves in the image they first identified the school and main roads. Children had no trouble or doubt to draw on the image, perhaps because they do not have any sort of responsibility over land, thus feel free to sketch without constraints. This attitude, however, should be regarded with caution since youngsters are prone to taking things lightly. Notwithstanding, their maps match the local land use dynamics expressed by the women and men. Technological knowledge, linked to age, also helped them identify spatial areas. Many of them had already seen satellite images by using Google Maps. Although the locality does not yet have phone signal and internet, many travel to Morelia city and imbibe the urban culture. As children have a different time dimension, they were asked to remember –also based on what they have heard from their parents and grandparents- and project in a 5 years frame.

| <b>Table 5. MAPPING SYNTHESIS<br/>(Maps 7 to 11)</b> |                     |                           |                           |                      |                      |
|--|---------------------|---------------------------|---------------------------|----------------------|----------------------|
|  | <b>Past</b>         | <b>Present</b>            | <b>Future continuity</b>  | <b>Future desire</b> | <b>Future horror</b> |
| <b>Land use classes (N°)</b>                         | 8                   | 10                        | 6                         | 6                    | 2                    |
| <b>Total N° polygons</b>                             | 17                  | 31                        | 15                        | 10                   | 6                    |
| <b>Mode</b>  | <i>Monte</i><br>(6) | Avocado production<br>(9) | Avocado production<br>(4) | <i>Monte</i><br>(3)  | Deforestation<br>(5) |
| <b>Largest</b>                                       | Resin extraction    | Avocado production        | Avocado production        | Reforestation        | No maize sowing      |



The main social conception among the children is that the landscape has changed from a more natural forest, where pines and wild animals dominated the environment, to an avocado setting. Correspondingly, in a broad sense they perceive that livelihoods in the community have changed from forest-based –particularly resin extraction- to avocado production. The main expectation about the future is that avocado orchards will continue to spread in number and particularly in area. It is a well-known fact that landholders are selling their land to outsiders that seek an avocado production. As a consequence, those who gather NTFP will have to travel longer distances to get resources. The desired landscape is one of recovery of lost forest and *monte* activities in areas that are now used for avocado production and agriculture. There is a profound wish to have more trees and animals. There is an interesting resemblance between the past and the ideal maps, which suggests a wish to reverse changes and resume old ways. Services such as paved roads, availability of water, infrastructure and antenna for communication, as well as an increase in social welfare, are longed for. On the other hand, fears are related to deforestation and loss of maize agriculture, which correspond with illegal logging and avocado orchards expansion.

### Methodological conclusions

A big advantage when working with children is that many attend school, and see the attraction of working in novel activities rather than having an ordinary class. The presence of the teacher also helps keeps order and attention to avoid distraction. The young can be very imaginative, as happened in the pilot test<sup>27</sup>, but they also have deep knowledge about their landscape as they begin to help in rural activities from an early age. Also, children showed no problem to locate spatially in the satellite image. This can be due to growing up more closely with technology and digital information and products. Some said they had

---

<sup>27</sup> During the pilot test the children were divided by gender and asked to depict future expectations without limiting to a realistic scenario. The results show boys are very susceptible to imagine unrealistic changes, for they transformed the entire *ejido* into a city, with all the urban features such as a soccer stadium, an airport, residential developments, among many other attributes they somehow crave. Despite the lack of realism, such desires do show aspirations that relate to urban lifestyles, and the influence of the proximity of Morelia city on them. Girls, on the other hand, were much more realistic and identified only land use changes similar to those represented in the official workshop. As a result of the vast difference between the two groups, in the further mapping we decided to work with mixed groups, particularly to balance the great creativity of boys.

already used Google Maps, which facilitates understanding the bird's-eye view of the landscape.

As with the women, the children did not restrict themselves to draw information only within the *ejido* limits. Some uses, specially associated with paid jobs in blueberry and avocado orchards, fall in the lands of neighbouring communities. Also, fishing in Loma Caliente Dam is an activity undertaken outside. This could be explained by two reasons: 1) children from neighbouring *ejidos* which do not have a school travel daily to Nieves, and they participated in the activity, and 2) children have less knowledge and responsibility over land boundaries since they are not yet owners.

### Findings conclusions

In terms of the future of the *ejido*, the young have a general orientation towards the recovery of forest activities, reforestation and avoid deforestation. However, the current situation which is leading to an opposite scenario, impacts upon their aspirations, particularly in boys who consider migrating in search for job opportunities and a better life. Expectations respond to the economic backwardness of the community, more associated with the lack of services such as petrol station, sports unit, park, antenna, roads and better social welfare. The incapacity to stop land sales and the expansion of avocado orchards discourages them. PLUP should definitely feed from youth's interests, needs and concerns.

### **Key informants**

“What they haven't stopped to think about, is that land is basis and mother”.

The previous statement was made by Secretary of the local government and captures the general feeling of this group: a deep attachment to the natural landscape and the desire to keep a traditional use of the natural resources. Land is perceived as an essential part of their life. As essential as the nurturing mother, as the archetypical mother who provides the first food and unconditional caring. Thus, land is conceived not only as matter –body-, but also as a deep felt organism. As the landscape is lived, it is inherently a living part of its

dwellers, and the material setting is a felt environment<sup>28</sup>. Meaning and intensity are intimately related to the individual and community history in that place.

The mapping session with the ejido President and Secretary led more to a conversation and oral discussion rather than to drawing and visual expression. Only two maps were generated (current land use, and realistic future). At first they had difficulty localizing known places, but after familiarizing themselves with the image they could differentiate patches of forest that belong to different owners and even small parcels. However, when asked to mark polygons they were very reluctant and afraid of drawing wrong boundaries. We believe boundaries are of great importance to them because limits are intimately associated with land ownership in *ejidos*, with a singular historical weight that dates back to the Mexican Revolution. They identified three main land use units:

- Agriculture: Mainly of seasonal maize and some oats, beans and wheat. Mixed agriculture is the main activity they wish to preserve, and the most vulnerable to land sales.
- *Monte*: Forest where pine resin is extracted, biomass harvested from old, sick or dead trees or with legal permit, animals taken for grazing where small seasonal parcels are settled. Monte refers to a mountain covered by woody plants where plenty of activities take place. Amongst the tree species identified, they mentioned pine, grey and white oak, hawthorn, and fir. Wood is extracted under legal permission and in small quantities.
- Avocado orchards: Mainly owned by outsiders. They are fenced and they block old paths and routes. It is the main reason for land sales and poses a current issue and threat.

The present land use map (Map 12) shows great accuracy in terms of boundaries, although some areas that belong to the *ejido* were excluded and not recognized as theirs. Interestingly, although they expressed antagonism towards avocado orchards, no orchard

---

<sup>28</sup> As Dardel elaborates in his *mystic geography* proposal, “Since the Earth is mother of all living forms, of everything that *is*, a nexus of kinship unites man to everything that surrounds him: humanity, the animals, even the stones. The mountain, the valley, the woods are not only a frame, an outside, however familiar. They are the man himself. It is where man makes and knows his own self” (2013, p. 112).

was actually depicted within the *ejido* limits. Avocado orchards are claimed to be an external threat that is starting to change the internal dynamic of the community, and will rapidly increase in a short time. Landscapes are very complex and, although knowledge of land covers helps us to detect land uses, the land use categories *per se* are richer, e.g. forests provide NTFPs, such as dead wood, fallen branches, mushrooms, berries, soil, herbs, fruits, resin, but they also provide timber, pasture for livestock and space for small agriculture plots. That level of information is impossible to achieve through only an external visual interpretation of imagery.

The main expectation about the future of the land is that it will change to become an avocado landscape “as it has already started”. What is more, they expect this to happen within the next one to five years. The main areas they expect to change are agricultural fields, as shown in Map 13. An important aspect is the social disorganisation the community is facing at the moment, which leads to opposing interests, and might have influence participation in the workshop. Desires for the future are associated with a traditional forest management where they could continue working with resin and wood from reforested trees. Moreover, they would like to keep the agriculture/pasture areas as they are. Such wishes integrate a preoccupation of the children, who would like to avoid having to work in other people lands. The idea of having a dam in the past and losing it is very strong, and it motivates a wish to recover infrastructure to manage water to improve the community. Fears focus on avocado area expansion and the changes involved, such as water loss.

**Table 6. KEY INFORMANTS LAND USE PERCEPTIONS**

|                    | <b>Land use</b>    | <b>Positive perceptions</b>   | <b>Negative perceptions</b>  |
|--------------------|--------------------|---|--|
| <b>Present use</b> | Avocado production |   | <p>“Small property owners have started to establish avocado orchards”.</p> <p>“Mainly, people who plant avocado are from outside the <i>ejido</i> who bought some land”.</p> <p>“We have no communication with the people who buy”.</p> <p>“We believe it can be harmful for us”.</p> <p>“Orchards block and affect extensive livestock farming”.</p> <p>“I repeat, what is doing more harm are the orchards”.</p> |
|                    | Agriculture        | Main activity.  | “We depend on rain because there are no resources to build a dam and catch water”.   |
|                    | Monte              | <p>Resin extraction from pines. Tree species: mainly pines, some oaks (white and grey), hawthorns and little oyamel. Each year wood extraction with permit (400ha of forest). Little extraction of oaks for firewood. Also used for mountain pasture. Remove fallen branches for firewood and to avoid fires.</p> <p>“The forest is in good state... and the pines we planted are growing”.</p> | “There is a problem with the flying squirrel that eats the pinecones”, it’s a plague.  |
| <b>Past use</b>    | Agriculture        | “We still grow maize, beans, wheat, oats”.  |  |
|                    | Small property     | There were no fences that blocked paths.  |  |
|                    | <i>Monte</i>       |   | People used to hunt rabbits and squirrels.   |
|                    | Road               | “The road that goes to the mountain was a dirt road and in rainy season we were not able to cross. Now we can go up the mountain with the truck”.   | “Other trails we used to cross have been blocked with fences by private owners who close off their orchards”.  |

|  |                              |   |   |
|--|------------------------------|---|---|
|  | Dam (now dried, as a lagoon) |   | 40 years since it broke. They used it for hydropower and irrigation of flower fields.   |
| <b>Future continuance use</b>                                    | Avocado production           |   | <p>“It [ejido, AN] can change, as it has already started. If someone sold 5 ha, obviously it is because they are going to plant avocado trees”.</p> <p>“In five years, maybe even next year, everything will turn [to avocado orchards, AN]”.</p>   |
|  | Community                    |   | <p>“We have talked between landholders [about maintaining traditional uses, AN], but there’s a lot of new people that come with new thoughts. The father dies, his son inherits the land, he receives a nice truck from an avocado producer and some money”</p> <p>“New ones don’t want to preserve the old ways. They just want their truck to be driving around”.</p> |
| <b>Future desire (positive) and Future horror (negative) use</b> | Avocado production           |   | <p>“20-25 ha in the high areas, because the top parts are safe from frost”.</p> <p>But avocado producers are also interested in lowlands to access water and take to their land.</p>  |
|  | <i>Monte</i>                 | <p>“That, instead [of changing land for avocado, AN] we planted trees to better the <i>ejido</i>”.</p> <p>Forest is at lesser risk of turning into avocado orchards because it is under common use.</p> <p>They would like to have a forest management, and be able to use those trees they planted under reforestation programmes.</p> | <p>“Changes in the high parts affect everything, not only that specific spot”.</p>  |

|  |             |   |   |
|--|-------------|---|---|
|  | Agriculture | <p>“If we could at least maintain what is already used for agriculture and pasture for all the children, so they wouldn’t have to go work on other people’s land”</p> <p>“A lot of people would benefit from a dam, and water administration”</p> | <p>Main areas changing to avocado used to be agriculture, so these are the plots that are at higher risk.</p> <p>“We have few areas for agriculture, so we can’t use them for reforestation”.</p> |
|--|-------------|---|---|

Methodological conclusions

As with men, the fear of drawing wrong boundaries and making mistakes regarding the information to be represented, had an impact on the time consumed, and the impossibility to make all of the maps as intended. There is no doubt that the key informants have a broad spatial knowledge of their landscape. During the activity they were able to locate plots of land in terms of landownership, but when asked to draw, they refused, claiming to be unsure of fully understanding the satellite image. We believe two main reasons explain such an attitude: 1) the novelty of working with a satellite image, this is, with the bird’s-eye view of the landscape, and 2) their fear, as political representatives of the community, of misrepresenting information in what they might consider to be a somewhat official product. In relation to this latter point, land sales should be considered as a delicate matter, for land boundaries play a fundamental role, and because community interests are strongly divided.

Albeit modest, P-Mapping allowed the depiction of relevant spatial local knowledge where experience was fundamental. An example of this is the identification of an agricultural area that is climatically shielded by frost in the dry season. It is a well-recognised area that provides security against the threat of avocado expansion, because avocado trees cannot develop in such conditions. In addition, the key informants were able to locate vulnerable areas susceptible to be sold. In terms of PLUP, the spatial localisation of these areas provides a visual basis to work from.

### Findings conclusions

As seen from the authorities' perspective, Nieves is facing two key intertwined problems that harm the development of the community: 1) social disorganisation, and 2) land sales mainly for avocado production. These phenomena have an interdependent relationship, and the increase of one leads irremediably to an increase of the other. Selling of land fractures internal cohesion, and opposing interests create conflict. In the same way, the cracking of the community opens a wider possibility for some to search for opportunities elsewhere and sell the land. Following what Cheng et al.( 2003) call "the old-timers vs the newcomers", who are contesting resource management with their different views and interests, the present group that took part in the mapping, would fit in the "old-timers" classification, polarised on the preservationist side. There is a strong feeling about "newcomers" bringing in harmful ideas<sup>29</sup>. What they wish is to stop the rapid changes and to at least maintain the landscape as it is. Such a perspective ties in better with the global concern for a sustainable future. Sustainability, as a key objective in PLUP, insists on redeeming traditional landscape management practices, and to enhancing them to be more efficient<sup>30</sup>.

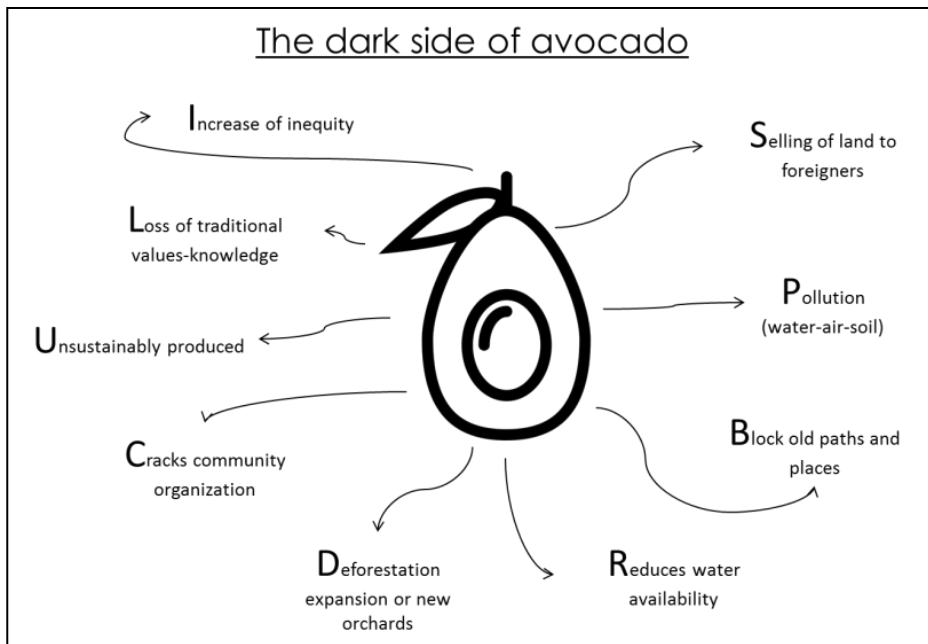
---

<sup>29</sup> Just as Mrs. Dean says in Brontë's *Wuthering Heights*: "We don't in general take to foreigners here, Mr. Lockwood, unless they take to us first". Such a territorial attitude is frequently found in rural areas where guarding local customs is paramount.

<sup>30</sup> "The challenge is to combine economic incentives with conservation of the natural resource base and to manage and use natural resources sustainably" (Schwedes & Werner 2010, p.18).



## The dark side of avocado



Avocado production is the most recurring issue identified by all of the groups. It is the main current land use change affecting the community. It is also the most feared and

expected land use change. This is evidenced when looking at the current land use map of the community (Map 14), the past map (Map 15), and the future expectations maps (Maps 16, 17 and 18). As analysed above, the perceptions, no matter gender and age, show that land sales for avocado production is identified as being harmful in many ways, ranging from social to ecological. Among the most salient issues are loss of social capital as a consequence of social disorganisation and the loss of forest and agricultural areas with particular local values. As illustrated in the picture, avocado has a dark side, and impacts both spatially –in the materiality of the landscape- and socially. The former is evidenced in deforestation and land cover change, as well as the loss of natural resources, trails and important places. The latter is related to community disorganisation, conflict, inequity and lower welfare.

Participants said there used to be forest or maize crops where the avocado orchards are now settled. Also, orchards are intimately related with land sales and outsiders' opposing interests. This represents not just a land cover change, but a livelihood and a cultural change, with political consequences in power distribution. Furthermore, the expectations on a realistic basis show the phenomenon will most likely continue. More avocado orchards

will conquer the landscape. As illustrated in the figure (Figure 1)<sup>31</sup> it is a daily complex problem the community faces. Men, women and youngsters in these exercises share the same general vision towards avocado production: a vision of negative impact. As pictured on the realistic and pessimistic scenarios, avocado orchards are expected to extend. The participants' ideal would be to maintain and promote old activities, such as resin extraction and maize farming.

There is a blatant feeling of despair and feebleness regarding the avocado wave. The economic attractiveness of avocado has already seduced some of the neighbouring *ejidos*, such as Umécuaro, Villa Madero, and Acuitzio. Making a quick flight on Google Earth suffices to picture the aggressiveness with which the fruit rolls out over the landscape. It has also massively spread in Uruapan and Tacámbaro (Tejera-Hernández et al. 2013) causing serious ecological and social problems. Recently, an arson attack intended to bring about land use change wiped out 300 hectares of forest under protection in Uruapan. The ecocide was triggered by avocado farmers seeking to extend their production, because of its profitability (Martínez-Elorriaga, 2016). In fact, avocado is nicknamed Green Gold due to the rapid enrichment of those shifting to its cultivation. In recent years, avocado has been claimed to be even more profitable than fossil fuels at national level. In financial terms, it is officially reported to be twenty five times more profitable than maize<sup>32</sup> (Torres 2017). In consequence, the organised crime has directed its attention in such profitability, and adds another power asymmetry that comes with violence and silenced fears.

As explained by the key informants, agriculture areas are at higher risk and more likely to be sold to outsiders interested in avocado production. Barsimantov and Navia Antezana (2012), in their research in two communities of Michoacán, also found that outsiders preferred to buy land that had already been logged, to plant avocados, so they would not have to be responsible for illegal logging. In addition, they suggest that communities with fewer land sales show a more natural structure, that is well-preserved forests. In relation to

---

<sup>31</sup> Avocado by lastspark from the Noun Project.

<sup>32</sup> Secretary of Agriculture (SAGARPA, in its Spanish acronym) reports that one hectare of avocado generates 600 thousand pesos per year, whereas one of maize yields only 24 thousand pesos. Thus, in order to promote forest conservation, the PES policy should take the avocado yield as the opportunity cost in the design of the compensation rate.

this, we propose that land sales bring new values and conflicting interests in terms of natural resource management that create conflict. More place-based research is needed to better understand the local reality. Mexican *ejidos* are currently facing many changes, among which landownership is a key issue. Differing cultural values, particularly between urban and rural groups, are expected to create “newcomers” vs “old-timers” conflicts (Cheng et al. 2003). PLUP is a strong strategy to counter these effects because it includes local presentation and negotiation of different interests coexisting in the same place, the promotion of social cooperation and organisation to use the landscape more efficiently in terms of production and by safeguarding the renewal of natural resources.

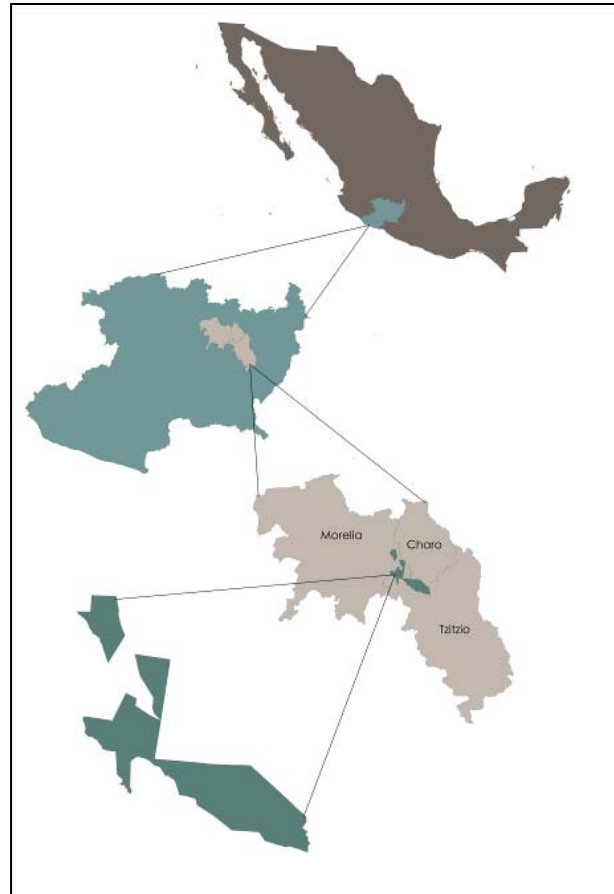
## TUMBISCA

Visited by plenty of visitors —hikers, mountain cyclists and motocross bikers—, specially coming from the city of Morelia, because of the beauty of the place, Tumbisca has well preserved forests that contrast strongly with neighbouring *ejidos*<sup>33</sup> which have suffered violent land use changes due to their closeness to the peri-urban expansion of Morelia, the main proximate urban area.

Tumbisca is a green-brownish landscape with watercolour sunrises that has been traditionally managed and continues to provide important forest resources —resin, firewood, mushrooms, potting soil, etc.—

for the livelihoods of the communities. Coordinates 19°32'02" North 101°04'53" West and 1725 m.a.s.l. altitude, Tumbisca is an extensive (3874 ha) and spatially complex *ejido* located southeast of Morelia city bounded by the Cuitzeo and Balsas basins. Its vast size combined with the topographic composition —a hilly area with an extreme altitudinal gradient that ranges between 2600 and 1120 m.a.s.l. and ecological changes that go from pine forest to oak forest and lowland forest— makes Tumbisca a highly rich and heterogeneous landscape.

Moreover, when social and cultural inputs are added, the complexity increases with the richness of relationships between the people and the diverse environment. The main economic activities are resin extraction for sale, and subsistence agriculture of maize.



<sup>33</sup> A quick Google Earth flight can show this contrast where agriculture is now the dominant land cover, e.g. Ichaqueo, San José de las Torres, and Atécuaro.

However, recently there has been a shift in agriculture, changing from sowing maize to planting agave for the production of mezcal, which, nowadays, is a mainstream drink and has a strong demand<sup>34</sup>. Agave growing is perceived as something good and beneficial because it represents an increase in household income. Seven settlements are spread through the territory: El Laurelito, Tumbisca, Buenavista, El Epazote, El Cuervo, El Cuartel and El Violín, hosting only 458 people, 96 of which are land owners.

The vast extent of the ejido persuaded us to select two settlements chosen for representativeness and accessibility, Tumbisca –homonymous community- and Laurelito, respectively. However, other circumstances, including lack of time, interest and willingness to participate in the mapping workshops, made it difficult to succeed in the whole set of goals. Thus, no comparison can be made between groups inside each community. Nonetheless, treated as isolated cases, two relevant participatory mapping sessions provided valuable information in relation to the main objective. First, the mapping carried out with the young who attend secondary school in the locality of Tumbisca. This gives a constructive scenario that comes from a generation that soon will be taking decisions that are going to impact the land, and who are affected by decisions taken in the present. The second, a group of women from Laurelito interested in participating in the project and learning new skills, and who contributed thoroughly by depicting a viewpoint –and voice- that is commonly overlooked or undervalued in rural communities of Mexico. Although these groups of actors do not usually have the power to make direct decisions about the land, their opinions matter as community members and as users of land. In fact, participatory mapping and PLUP encourages the participation of those who are less empowered, and hence less heard.

Another incomplete session conducted with landowners of Tumbisca was adapted and reduced in order to adjust it to the time participants were able to provide. Information from this session is included because it adds valuable data regarding the present state of the

---

<sup>34</sup> Between 2012 and 2013 national production of mezcal had an increase of 140% with important markets in international cities like New York and London, considered as a gourmet beverage. Michoacán is one of the eight states that have an appellation of origin (González G 2014). The appellation was recently obtained in 2012. This can explain the present increase in production. However, on a national scale, Michoacán only contributes 0.5% to the total production, Oaxaca being the leading state with 93.7% (CRM 2015).

landscape, and gives an overall picture of future situations. Some of the participants work and live in Morelia city, as do many of the land owners in the community, and they have little time for activities without monetary rewards. However, important evidence about present productive activities, such as agriculture shifting to agave production, and a forest burn that left a big area unusable for NTFPs management, were mapped.

| <b>Table 7. Mapping sessions held</b> |                  |                     |           |
|---------------------------------------|------------------|---------------------|-----------|
| <b>Group</b>                          | No. of workshops | No. of participants | Community |
| <b>Landholders</b>                    | 1                | 4                   | Tumbisca  |
| <b>Youngsters</b>                     | 1                | 19                  | Tumbisca  |
| <b>Women</b>                          | 2                | 15                  | Laurelito |
| <b>TOTAL</b>                          | 2                | 23                  |           |

### **Landholders**

Mapping with the landowners was not easy to schedule, and this is mainly due to the fact that they are usually very busy, both in productive activities and in community work. Furthermore, as in the case of Nieves, spending time in non-monetary rewarding activities could be discouraging or unattractive for people who depend on generating income on a daily basis. Although we found some superficial evidence of group conflict, and it was one of the reasons to cease working there, we also detected a strong leadership and social organisation coming from very proactive actors. Previous work done by other members of our institution has strengthened social cohesion and trust by participating as intermediaries between government institutions and local development. However, projects that are funded by the government are of priority importance and time consuming. For the reasons mentioned, just one workshop was scheduled and during the session only one map was hardly finished. In general, in the workshop participants maintained that they were in a hurry and they had only a short time to stay.

**Table 8. LANDHOLDERS' LAND USE PERCEPTIONS**

|                    | <b>Land use</b>    | <b>Positive perceptions</b>   | <b>Negative perceptions</b>   |
|--------------------|--------------------|---|---|
| <b>Present use</b> | Agriculture        | Mainly maize and beans. Some firewood is collected from dry trees, and livestock grazing after harvest.   | In the dry season they have to buy pasture to feed their animals.   |
|                    | <i>Monte</i>       | Resin is the main productive activity. Firewood is gathered from dry trees or when areas of forest are changed to agriculture and trees cut down.             | Forest pests & diseases are one of the main problems. Years ago it was rare to have pests, now they are everywhere. "They eat the juice from the heart of the tree until it dries". It is very hard to battle the pest because of the height of the trees. "When we detect the bug it is because it has been hosting for a long time." The forest technician they have has not helped in any form in the 10 years he's been in charge. They know some strategies to control the pest, but they are expensive and they cannot afford them. |
|                    | Maguery plantation | They started planting some last year, and now they are planting more. They grew them in a plant nursery. People are starting to test with a plot of 1-1.5 ha. |   |
| <b>Past use</b>    | Settlement         |   | There used to be a place more than 40 years ago called "Los Amoles", "but then people left the ejido to go live in Morelia city or elsewhere".  |
|                    | NTFP extraction    |   | They used to gather "yellow soil" to paint their homes. Now they don't do it anymore.   |

|   |                   |   |   |
|---|-------------------|---|---|
|   | Agriculture       |   | <p>“Years ago we used to grow vegetables and tomatoes, but now this has diminished a lot”. They stopped because they started to have trouble with pests –white fly- associated with rains. Areas that they now use for maize growing were used as guava orchards.</p> |
|   | Maguey            |   | <p>Many years ago there used to be a lot of naturally grown maguey, but people used it all and finished with it. “Perhaps because they didn’t think about the future”.</p>  |
| <b>Future continuance use</b>                             | <i>Monte</i>      | They think that they will keep producing resin, unless another fire burns the forest.   |   |
|   | Settlement        | “Maybe it will grow a little”.  | If Tumbisca had working opportunities for people its population could grow, but there’s not much. On the contrary, the children look for opportunities elsewhere and if they adapt to living in another place, they prefer to stay there.                             |
|   | Maguey plantation | <p>Since people are starting to plant, they expect more to come, especially in the lowlands where the soil and weather are more suitable for growing. They think half of the area destined to agriculture – maize in the lowlands can change to maguey.</p> |   |
| <b>Future desire (positive) and horror (negative) use</b> | Communications    | Paving the road would allow people from Tumbisca to travel daily to the city of Morelia to work. This way people could find interest in living in Tumbisca.   |   |



|  |                   |   |  |
|--|-------------------|---|--|
|  | Forest management | “Maybe a forest technician could find out how to control the pines pest, or even they could spray the pesticide from an aeroplane”. |  |
|--|-------------------|---|--|

Livelihoods in the locality of Tumbisca are forest-based and combine the production of resin, seasonal agriculture and livestock. As shown in Map 19, the northern part is most suitable for forest management, whilst the southern is used for agriculture. Nonetheless, both activities are somehow spatially intertwined. Small agricultural plots are settled throughout the forest, and livestock is taken for grazing in these areas after the harvest season. However, the pasture is not enough to feed the animals the whole year and they have to buy fodder during the dry season. Changes related to the past include the loss of a more diversified production of vegetables, tomatoes and guava, towards a maize-based agriculture, which is partly perceived as the result of changes in the weather and rains, and the presence of a pest. Also, a forest pest has been causing serious damage by drying many trees. A strong desire is to exterminate the pest with external help –in terms of knowledge and funding. Fears are forest related, both towards pests and fires. The main expectations about the future are the continuance of the complex forest management –primarily resin, but also firewood and berries extraction and agriculture, and an increase in agave production for mezcal, since it has been gaining value in the last years and people are shifting to its production, particularly in the lowlands with warmer weather.

### Conclusions

Locating themselves in the image turned out to be easier for some than for others. “This [mapping, AN] is like a puzzle that has to be put together”, said a young man who was very participative throughout the whole session and in charge of the marker. This reflection shows two interesting points that are at the essence of assembling a puzzle. First, the

difficulty<sup>35</sup> of working from scratch, find the corresponding pieces and the necessary patience to do so. And secondly, the intuitive process of fragmentation to make a bigger picture. It is undoubtedly true that beginning a map can be as hard as starting a puzzle.

The forest plays a key role in the livelihoods of those who live in Tumbisca. It is the basis for subsistence and production. When asked if they would consider moving to another part of the *ejido*, they mentioned there is not much to do in the southern parts, “there are no trees for resin and there’s the water [availability, AN] issue”. This illustrates that the forest livelihood is deeply inculcated into their lives, and that the permanence of the forest is of crucial importance for the local welfare.

Land sales occur only among members of the *ejido*, not to outsiders, and they do not represent a serious problem. However, many people are now living in Morelia city, partly explained by the road that offers good and fast access between the city and the locality. For that reason, landholders have chosen to rent their lands to people from the community that do not have land rights. This poses complex issues, since the actual active users are less concerned about the ecological stability and permanency of the land, whilst the owners are becoming impregnated with urban values, interests and aspirations.

Although concerned with many things such as pests in agriculture and in the forest, when asked about the problems they have to face, their response is passive and hopeless. “It’s hard to identify the problems we face because we are accustomed to them. For example, the road could be paved and perhaps we would be better off that way, but we are used to it as it is”. –says an elder man. To that statement, a woman adds: “You get used to what you see and what you have”.

## **Children**

A secondary school can be found in the locality of Tumbisca in front of Tumbisca Mountain. A football field shields the entry and offers an open space for exercise, relaxation and amusement. Inside the school boundaries there is a communal dining room

---

<sup>35</sup> In Spanish, “rompecabezas”, word for puzzle, literally means “head breaker”.

supported by SEDESOL<sup>36</sup>, three classrooms and volleyball court. The participatory mapping workshop was held in this place. Twenty one youths ranging in age from 12 to 15 participated. Three groups were made to keep order and to give more opportunity for quiet students to participate. They were divided into three groups: one of boys, one of girls and a mixed one. Our research project expected differences to emerge between the boys and girls since social roles, obligations, and spatial mobility and knowledge are strongly related with gender in rural areas. Boys were able to produce all of the maps requested. The group of girls failed to represent the past scenario and the fearful scenario. Finally, the mixed group only failed to draw the last map –fearful scenario, since they argued that it was simply the opposite to the ideal, and they were very tired with the activity. However, in all of the groups the past map brought difficulties for locating areas that have changed. In a broad way, the past is perceived to have changed from a more natural landscape to a more humanized one. Children have knowledge about the past mainly by what their parents and grandparents tell them, thus, in an oral form. Although they have a broad understanding of how the landscape has changed, locating particular areas and mapping the past was not an adequate methodological approach for that age. It is recommended for future research to work past-present changes with the elderly, and to concentrate with the youths on the future maps. The future is perhaps more relevant for the children.

Resin and *milpa* are the most valued activities detected. Both are key components of the *monte* unit which encompass other important practices such as: timber and firewood gathering and livestock grazing. These uses are directly associated with livelihood survival and with economic income. Resin is the core natural asset, whilst agriculture provides a second means of support. As some girls stated, “the worst would be to stop collecting resin and to have fewer *milpas* because that is what is more profitable”. Economic dependence on the forest triggers a conservationist attitude<sup>37</sup>. Forests mean money and money means possibilities. But forests are not just about money; they signify clean air, soil and water,

---

<sup>36</sup> Secretaría de Desarrollo Social (SEDESOL; Secretariat of Social Development) through the programme *Comedores Comunitarios* (Community dinners) provides food to the disadvantaged and those in need battling food insecurity.

<sup>37</sup> This was also detected by Campos et al. (2012) in their study on the coast of Michoacán. Local people identified the *monte* unit as a priority area for conservation since it provides many environmental services.

landscape beauty, fuel, medicine, food, and much more. Such a diversity of ecosystem services is clearly identified and valued regardless of gender.

### Boys

The vast knowledge that young men have about their landscape is surprising. Boys had no trouble locating places in the satellite image and provided valuable information regarding land use. The present land use map (Map 20) is evidence of the richness of the landscape in terms of how it is experienced and lived, mainly, in productive terms, thus it shows the fruitfulness of working at the local scale. Usability is tightly related to productive activities. Toponymy<sup>38</sup>, or the name of places, which have cultural and historical value, helped them locate, classify and describe different areas. Also, toponymy enriches the content of the map and shows the importance of the physical setting in the appropriation and signification of the landscape. As shown in the present map, availability of forest resources such as resin, firewood and wood, is of key importance for the development of the community. It is also important to notice that forest management is frequently intermingled with agriculture – mainly maize and agave, and livestock, making small productive and diversified units which rely mostly on household capital, since land is distributed individually among land owners.

As mentioned before, mapping the past with the children was not accurate. Although they have knowledge from their parents and grandparents, it is not necessarily in a spatial form. However, by using the same polygons from the present map, they were able to represent what they know and how they perceive the landscape to be in the past; toponymy was very relevant. In a broad sense, they remember the landscape as having been used less intensively: less extraction, less agriculture, less production. Some areas are even identified as “virgin forest”. Such a perception shows that the landscape has changed in terms of intensity and extent of use. In the present map, the main activities are reckoned to be forest based. Fires and pests are recurrent threats they have had to cope with since the past.

---

<sup>38</sup> “Names in general are only rarely randomly chosen, and this is especially true in the case of geographical names” (Tichelaar, 2002, p.13).

In the realistic scenario (Map 22), the boys expect positive and negative changes in regard with forest cover. On the one hand, some areas are believed to be destined for reforestation activities, supported by the government, whereas on the other, forest loss is likely, particularly driven by natural threats such as fires and pests. Due to the recent profitability of agave growing, plantations of this crop are expected to spread, mainly in the dryer region.

Losing natural and productive capital are the core fears identified by the boys (Map 23). Physical phenomena such as fires, pests and landslides are strongly linked to possible losses and classified as important threats. Forest loss is also related to deforestation and land use change for agriculture production. Losing livestock, crops and water availability are represented as negative conditions in the fearful landscape scenario. Being unable to use and profit from the land is perceived to be the worst that could happen to the local reality. Contrastingly, the ideal landscape (Map 24) is highly productive and richer. It seems as if “more” is always better, more water, more forest, more bees, more agriculture, more livestock. Such an aspiration unveils an ambition to grow, to increase, and to develop. This is frequently counter-linked to poverty and scarcity, and to economic trends, particularly influenced by the urban environment. Also, the young are more susceptible to having more idealistic aspirations, which are frequently inconsistent in practice. However, the desire to use and preserve forest-based activities and a rural livelihood prevails.

### Girls

In comparison, girls depicted fewer areas and provided less information than boys, mapping only three of the five intended maps. Nonetheless, they were able to locate areas in the satellite image and provide valuable information that enriches the understanding of the local reality from a different view. For the present time (Map 25), the dominant land use identified is resin extraction, which is developed mainly in the higher parts of the landscape. The economic reliance on a forest-based activity brings a conservationist attitude in terms of how the natural environment is valued that is highly important in the current international agendas that aim for a global sustainable future. Although fragmentation of the biological realm is frequent in inhabited environments, usability is many times a means towards the safeguarding of ecosystems. Such is the case of forests

that, by providing a source of income, enjoy an inherent protection. Caring for the forest is more easily achievable if a substantial economic return exists. Thus, natural threats such as fires and pests are carefully monitored by members of the community. Indirect threats such as proximity to urban priorities and lifestyles are also absorbed partly by the possibility to generate significant income at home. Correspondingly, in the negative scenario, although this future scenario map was not achieved, girls expressed that the worst would be to lose the possibility of collecting resin and to have a decrease in agriculture. A balance is desired between preserving the current agriculture fields and keeping forest areas. However, in the ideal map (Map 27) girls put more weight on following a forest-based livelihood, where having clean air, more water in the river, more trees and more fruit trees are of high importance. Despite the few polygons drawn in the expected scenario (Map 26), what was represented is a sample of the general thinking. Girls believe in a nearby future when more agriculture will bring forest loss. Nonetheless, a big area burnt from a fire years ago is currently under natural recovery and it is expected that trees will grow there. Finally, a recurring idea is that more people will arrive in the settlement, thus more houses will have to be built. If an increase in population happens, developing a PLUP would be appropriate in order to reduce conflicts in the future concerning the social and the natural capitals.

#### Mixed group

It is difficult to separate whether participation of the girls in this group was overshadowed by the male dominance, which is frequent in rural environments in Mexico, or by a difference in spatial knowledge related to gender roles, mobility and territory coverage. Perhaps it would be a mistake to separate such reasons, since they are usually intermingled. Despite this situation, some girls did participate and discussed with the group. At the end of the workshop, this group was able to produce four of the five maps intended, providing the information for the missing map in an oral way, since they were tired of the mapping activity.

The size and number of polygons drawn in regards with forest management for the present map (Map 28) show evidence of the economic and social importance of the forest ecosystem in the local livelihoods. Corresponding with the group of boys and the groups of girls, resin appears to be the most important activity and land use. However, it is important

to note that forest areas are rarely used in a single way, rather in a more complex management often mixed with other activities, such as wood, firewood, potting soil, blackberries and mushroom extraction. Thus forest use under community ownership should be understood as a complex setting. Additionally, the children said that on their way to their plots they gather oranges, limes and blackberries to take home. Accordingly, the paths are not only relevant for mobility but also as routes that allow a more efficient and rich use of the landscape. Furthermore, growing vegetables in the home garden was mentioned as an important use, however, it was difficult to spatialize at that scale.

As previously mentioned, making the map of the past (Map 29) was difficult and inaccurate with the children, since they have little precise spatial knowledge about particular physical changes. Burnt areas, which take plenty of time to recover, and leave physical scars and evidence, were the easiest areas to identify. Another significant change that the children recognise is the current presence of forest pests which did not occur before. Such a change could be thoroughly analysed in relation with climate change in future research. The frequency and intensity of fires are also of interest in climate change research. Finally, a third important change was said to be the conversion of forest areas to plantations of agave. However, it was also mentioned that many of the landholders are shifting from maize or other crops to agave, testing the profitability with small areas of one or two hectares. As a result of this situation, an important expectation for the future, as seen in Map 30, is a significant growth in the area destined for maguey, which would lead to a loss of forest. In addition, other areas are expected to suffer forest loss from wood extraction. Such expectations are of concern, not only with respect to the environmental paradigm that calls for the safeguarding and good health of the natural environments to provide the local communities with natural resources and ecological services, but also because the portrayed ideal future, as pictured in Map 31, is forest-based. As has been constantly said and confirmed again with the ideal scenario, the forest is of high value and very significant for the continuance of the local livelihoods. Children believe promoting forest regeneration is beneficial for their development, and this is a crucial attitude to take into account if a rural sustainable development is wanted. The children's perceptions, in terms of wishes and fears regarding the environment and the future of their lives, are actual drivers of the future of the landscape.

## LAURELITO

Laurelito is the northernmost settlement of the seven localities of the *ejido* of Tumbisca. It has the highest altitude and a dense forest cover. It has the best road access, which leads to many people searching for part-time jobs in the city of Morelia, whilst others remain. The principal economic activities are resin extraction and maize growing. Among the threats identified are fires, destruction of trails and soil erosion because of motocross, and deposition of garbage by outsiders. Other projects from UNAM are being developed there, such as: construction of ferro-cement tanks for rainwater harvesting, bio-digesters and cabins for ecotourism. These are external efforts to contribute and help the community with tangible and useful infrastructure.

The idea and topic of the workshop was presented during a meeting and had a low response. When they were asked who would be interested in participating, very few responded. Some said they were very busy. A woman identified as influential, was asked to summon a group of women, and she generously accepted. A few days later the workshop took place in her house. Only four women, including her, came to the workshop.

Later on, as a fieldwork activity of the course Cultural Landscape, Local Spatial Knowledge, and Participatory GIS of the Masters programme (2015) in Geography given at CIGA, UNAM, another workshop was planned, again with women. 14 women showed, including 3 of those who had already participated in the last session –they didn't repeat the same maps, instead they were asked to depict alternative information. Since women take care of the children as part of their responsibilities, there were many kids around and, understandably, interruptions occurred frequently. This, however, led to a rotation of the marker among the participants. During this session UNAM Masters students mediated the activity following a previously written script.

There were some difficulties to continue working in Laurelito, basically because of lack of time from our side and of lack of interest on theirs. Also, due to internal conflicts concerning land boundaries, continuing with the participatory mapping activities was considered intrusive and unwise. The maps produced only show the women's perceptions. It is recommended to try and sow interest in men and to continue this unfinished initiative,



so that the maps can be strengthened. We would encourage trying with other participatory and ethnographic tools, such as transect walks and semi-structured interviews. Also, validating and working with the women’s maps as a starting point could be a good strategy to motivate participation from other groups. Finally, the present work could benefit a long-term project aiming for participatory landscape planning.

**Table 9. WOMEN’S LAND USE PERCEPTIONS**

|                    | <b>Land use</b>             | <b>Positive perceptions</b>   | <b>Negative perceptions</b>  |
|--------------------|-----------------------------|---|--|
| <b>Present use</b> | Water bodies                | Use of river water for agricultural and domestic activities.  | The river is much deteriorated; at certain times of the year it disappears. This didn’t happen before. They are exposed to solid waste. “Las palomas” and “Los lobos” springs are about to disappear.  |
|                    | Agriculture                 | <i>Milpa</i> (mainly maize and beans). Some areas are used to feed the livestock.   | Cropland extent is increasing. Usually parcels of land support family households.  |
|                    | Settlement                  | Domestic and educational activities   |  |
|                    | Forest management           | Extraction of resin, firewood, soil and logs. Wood and firewood depend on dead or fallen trees.<br><br>There are <i>axolotls</i> living in the river that crosses the forest. | They have to go to more distant places to gather firewood. Areas of land under lease for resin extraction get overexploited. Illegal logging. People from Morelia come and leave their garbage in the forest, break the resin collection cans and take soil and mushrooms. |
|                    | <i>Nopal</i> cultivation    | Production for home consumption.  |  |
|                    | Ecotourism project (cabins) | For tourist development.  | When students from UNAM come, they leave their garbage. Some of the women have never been to the cabins.   |

|                               |                   |  |  |
|-------------------------------|-------------------|--|--|
| <b>Past use</b>               | Settlement        | Currently there are 28 houses.<br>Women now have more participation in the <i>ejido</i> political body.<br>Women successfully pressured the men to build the school.<br>Community was more peaceful: there were neither outsiders nor bikes. | 40 years ago there were only 4 houses, no public services nor school.<br>They had no transport. They had to walk on foot.  |
|                               | Forest management | They used to hunt wild animals (mourning doves), extract firewood and stream water.  | Forest was in better condition. 38 years ago there was a fire that wiped out a part of the forest.   |
|                               | Agriculture       | <i>Milpa</i> production.   |  |
|                               | Livestock         | Mainly bovine.   |  |
|                               | Water bodies      | Domestic use.  | There used to be a spring. River was bigger and had frogs and <i>axolotls</i> .<br>Springs had more water and water was cleaner.   |
| <b>Future continuance use</b> | Settlement        | More houses are going to be built in the north part.   | There will be fewer children.  |
|                               | Forest management | Wood and resin extraction.   | If bad management continues: loss of forest (firewood and resin), soil erosion. Those who rent their plots to outsiders can lose their forest.                                     |
|                               | Water bodies      | Agricultural and domestic use of water.  | Pollution of water.<br>If agriculture grows, there will be more extraction of water for irrigation.<br>If deforestation continues to extend agriculture, there will be less water. |
|                               | Agriculture       | <i>Milpa</i> .   | Is going to extend. Soil erosion, fertility loss and use of agrochemicals will increase. There is not going to be enough water for irrigation.                                     |
|                               | Ecotourism        |  | If it is not well planned it will bring pollution and problems.  |
| <b>Future desire</b>          | Ecotourism        | If it benefits the community.  |  |

|   |                                |  |   |
|---|--------------------------------|--|---|
| <b>(positive) and horror (negative) use</b> | Reforestation<br>Deforestation | Reforestation is needed, to continue having water supply.  | If people continue logging the forest there will be neither wood nor resin to sell.   |
|   | Settlement                     | More schools and teachers and more health centres. Paved roads and public transport that reaches the community. Better services, such as drainage, internet, garbage collection, a crematorium and employment for women and the young.   |   |
|   | Motocross                      | If people with motor bikes stop coming.  | If it would come to violence, since the bikes damage the walking trails, cause soil erosion and make noise and conflict can result. |
|   | Forest management              | Resin and mushroom extraction.<br>Production of fruits and vegetables through government assistance and programmes.<br>Establishment of animal pens. Increase fertility of soil.<br>More resin extraction and less wood extraction. Have no intruders.<br>If the resin had a higher price. |   |
|   | Water bodies                   | Harvest rain water to let the springs recharge.  |   |

For women, having a good –sustainable- forest management and *milpa* agriculture is of crucial importance to the continuity of Laurelito. Forest management, which includes NTFP extraction such as resin, firewood, soil, berries, fruits, medicinal herbs and logs, is currently the most widespread use (Map 32). Agriculture is also important, and is expected to grow in extent (Map 34). However, such activities as they are currently developed carry ecological problems such as water bodies’ depletion, forest loss and overexploitation of forest natural resources. They believe reforestation and rain water harvesting can help recharge the water bodies and increase resin extraction. Water, intimately related to forest management and agriculture, is a key resource for women. They identify the loss of some

streams that used to benefit the community, the current problem of water reduction and pollution, and the future need to ameliorate this situation. Generally, the past is remembered as a “more natural” landscape, with more trees, more water and fauna, hence, with more natural resources and of better quality (Map 33). Such a landscape is seen as a positive scenario that must be recovered. Protection, conservation and recovery of the natural environment are perceived to be of key importance for the development of the community. This becomes really apparent when viewing the ideal map (Map 35), where forest management and reforestation dominate the desired landscape. Strongly linked to achieve this scenario is the enhancement of social organisation and education. Fears, on the other hand, are related with forest loss, fires, pollution and damages caused by visitors from Morelia city (Map 36).

### Conclusions

Despite women in Laurelito are mainly housewives and know few things about the ejido from experience, since they do not travel long distances, they showed to have a rich knowledge about the use of the landscape and had no trouble locating and drawing spatial information. Much of what they know is learned through communication with their husbands. Most of the women showed enthusiasm and interest in the activity. Having a positive attitude helps enormously in the successful depiction of maps. Working in a community where other projects are being developed, brings positive effects since people are already habituated to participating in different projects. But simultaneously it can bring negative effects because having too many activities may result in being repetitive, boring and time consuming.

There is a strong relationship with neighbouring ejidos that lead to marriages and migration of women from elsewhere. Some of the women who participated in the workshops had lived only a short time in Laurelito and, in consequence, had little knowledge of land use. Nonetheless they contributed with what they knew and encouraged local members to participate and learned from them. New members bring different ideas and values and more analysis is needed to understand the possible effects in the future landscape.

Proximity to the city is perceived as something good as it opens the opportunity for the people to search for jobs, but negative because it allows people from the outside to visit the forest and cause damages. Bikers are a well-known group that cause damage and leaves no benefit. People from the city use the landscape for leisure without considering the effects on the local people.

Preference towards a more sustainable landscape is of great importance for the preservation of the natural environment and capital, as well as for social empowerment and equity. Women are an essential group in the community if the intention is to aim for a sustainable future, because they show a strong interest in preserving and promoting the recovery of the natural environment, and, at the same time, worry about the welfare of the community.

## Chapter 4: General conclusions & Discussion

---

### DISCUSSION

**T**his study makes efforts to find information that goes beyond the tangible and quantifiable, i.e. search the hidden depths that lie in the experience of those who inhabit the landscape. Moreover, it champions the belief that rural people are capable of doing things – mapping - that are more commonly recognised to be only in the realm of specialists (Chambers, 1994). Land use maps in practice become more refined when local spatial knowledge that comes from direct experience is included. Intangible elements – the expectations - of the landscape resulting from the human-environment relationship can be spatialized by applying a participatory mapping approach, and are an important input for (participatory) land use planning.

Rather than simply a matter of individuals' capabilities, broader issues such as poverty, urbanisation, globalisation and perceived climate change can affect people's interest to participate. Hence the success of short time span projects with limited resources making it difficult to continue the efforts; such as is the case of many small-budget university projects. Currently, rural people have to deal with plenty of stresses of economic, political, cultural and ecological character that are time consuming and of immediate relevance. It appears that spending time in planning or participatory mapping workshops is a luxury that not everyone is capable of or willing to do. Long-time (traditional participatory) projects

with enough resources to provide continuity and facilitate the fulfilment of local objectives are definitely needed in order to really strengthen participation, empower local communities, and favour self-management.

At heart, participatory mapping works: the skeleton moves; knowledge becomes articulated in a spatial form. People without previous training can translate their empirical knowledge and imagination into cartographic language. Many studies have been published concerning local spatial knowledge (Antrop 2000; Brown 2004; McCall 2004; McCall & Minang 2005; Matthews & Selman 2006; Rambaldi *et al.* 2006; Fagerholm, Käyhkö, Ndumbaro, & Khamis 2012; Campos *et al.* 2012; Nassauer 2012; Debolini *et al.* 2013). This study adds to that mass of efforts. It is about studying humanity as an agent with changing faculties living in a changing and changeable world and, moreover, being a changeable creature. It is also about landscape production as a human artefact that struggles between global and local design (Lefebvre 1974; Nogué 2006a). Moreover, since people and environment are both unstable and uncertain, central interest relies on spatial variability and particularity. Recently, change has reached a global level resulting in global issues with effects in the local communities. Mapping expectations of the future is one way to visualise and anticipate plausible scenarios, and develop strategies to cope with change.

The two sections below discuss (i) insights into how participants performed the chosen methodology of participatory mapping, and (ii) the content results of what the maps represent.

## **The process of mapping**

### Everyone can map

As Chambers suggested more than twenty years ago (1994) in his PRA approach, "...villagers have a greater capacity to map [...] than outsiders have generally supposed them capable of" (p. 1255) (Chapin, Lamb, and Threlkeld 2005; Chambers 2006; McCall 2014). This study corroborates that assertion for the case of three rural communities of Mexico, by including the participation of the active users of the landscape to the mapping

exercise. Furthermore, mapping, being a visual representation based on personal knowledge and ability, has variable outcomes: different groups of people produce different maps. Villagers should not be conceptualised as a broad, homogenous mass, as a whole. Quite the opposite, the local people are a highly diverse category, where different kinds of knowledge and interests perform together. For example, as can be seen in Map 6, men from Nieves depict the forest mainly in terms of products that are recognised to be of monetary value – such as timber, resin and firewood –, whilst the women (Map 2) and the young (Map 8) include other products of self-consumption like mushrooms, wild berries and potting soil. We can assert that regardless of gender and age, everyone can map -and give valuable contributions. Actually, since different people have different knowledge depending on their livelihood, then, multiple hands – multiple voices/stories - are needed to achieve a more detailed portrait. The elderly played a key role when depicting information about the past, and the young showed a strong imagination. Women were enthusiastic and participative, and men showed they have great spatial accuracy, although they were sceptical to draw and rather preferred to talk.

### Leadership and passivity

Working in groups involves mixing personalities. During the workshops we noticed a reiterative and spontaneous distribution of roles. Some people are seen as local *experts*, and that can be for many reasons: 1) those who spend most of their time working outdoors and daily travel long distances and cover large areas have a more extensive spatial knowledge, 2) those who have been living in the community for a long time, the elderly, 3) those who have or have had positions on the board of the ejido, and, 4) those who have the – natural, or trained – ability to quickly locate spatial landmarks in the image. These *experts* are usually assigned to be the drawers, to hold the markers, whether self-assigned or selected. Despite that everyone can map, not everyone is willing to. Some people delegate the markers to others and prefer to participate by speaking. The marker (the “stick”) operates as an instrument of power. The person who manipulates it has control over the size and shape of the polygons, and slowly feels more comfortable and confident. The rest of the group take a more passive attitude, or give opinions and complement the information. Two



important questions arise: 1) is wide attendance beneficial in the mapping exercise, even with the risk of having passive participants or is it best to map with specific actors who have more knowledge in particular arenas, and then invite the rest to contribute with ideas? 2) Is the mapping exercise an empowering activity only for the leaders, reinforcing social imbalance?

### Better things to do!

Unlike surveys, that can be designed to last 10-15 minutes or even less, participatory mapping is a time-consuming activity. Workshops were planned to last 90 minutes approximately, but things always take longer than planned. Men, who were the harder group to gather, are usually busy working in the fields or in the forest, and return tired and unwilling to continue working. Spending too much time is non-viable for certain people. Digging and searching for detailed information takes time. Making five maps –past, present, future expectations, wishes and fears – turned out to be tiring and boring, too much time needed to be invested and the activity was monotonous. Low participation may reflect that people have better things to do. Or, even more, that planning is a luxury that is hard to afford in terms of time. However, investing time in planning for a future is believed to bring positive effects in the long term. Moreover, mapping helps in reducing time in the planning exercise.

Without a genuine and owned objective generated inside the community, the activity is more likely to fail. These observations could help understand why some of the groups were incapable of producing all of the maps.

Individual emotional barriers are important too. Internal conflicts can affect who attends the meetings, and what information is shared. Occasionally, one's own feelings are more important stuff to worry about than responding to a crazy external researcher's queries. Potential conflicts between influential members or families, and essential ideological differences between local inhabitants, need to be taken into account, since they will bias the information depicted.

### Shy or bored? Confident or not?

Apathy or no confidence for drawing, but an interest in talking: some people don't like to draw. Drawing is not appealing for everyone. Some, however, like to talk and to tell their story instead of mapping. That is why recording is so important. During the workshops, two recurrent conditions arose: apathy and lack of confidence. Apathy is most likely a consequence related to the main objective of the research which, by not starting as a community proposal, turned out to be irrelevant for some participants or failed to be attractive enough.

Working through projects that sprout from a local interest takes very much time and they are hard to find, since there is usually little and weak communication between rural communities and institutions like universities that are in cities. The time issue is two-sided, both for the external researchers or NGO groups that depend on institutional and bureaucratic timing to deliver results, and for the local communities who either have to travel or wait to receive support. It could be argued, however, that without external promotion, and the motivation of those who happily participated, the present mapping would never have existed.

Some people are naturally indifferent. Lack of confidence, on the other hand, is a feature of people's character that is intimately related to engaging with new things. To illustrate, we can think of someone who gets into the sea for the first time and experiences the fear of what is new. The temperature of the water, the wobbling movement, the turbid water that hides the feet from sight, the vastness and the salty flavour, all elements that give a sense of uneasiness. The situation is understandably unsettling for the one who is struggling to stay afloat. Similarly, mapping can feel like floating in the vast ocean. Nervousness inexorably affects the outcome. It is commonly accepted that it is through repetition – training/practice - that a skill can be mastered.

## Visualisation

Cartography as the visual language of differentiated and ordered features to represent geographic reality has been a basic tool of humanity since ancient times (Harley, 1987). People are capable of translating experiential information into meaningful symbols about spatial elements which can then work as a more universal language. Maps like paintings, even though they are motionless, are telling a story, a visual one. The composition is made by a sort of storyteller who selects which elements will be shown. The decision to display, or to hold back, information is complex and based on many factors. Paradoxically, the visual elements marked are not necessarily the most valued, treasuring something can also lead to concealment. Hence, important information can be either represented or hidden.

For some, enclosing areas by making polygons may seem to them to be drawing boundaries with political significance and this may inhibit the drawing. Local authorities are used to working with cadastral and topographic maps, in which lines represent land property or political limits. On the other hand, key informants from Nieves showed a dubious attitude when asked to demarcate areas. Moreover, when landscapes contain opposing interests, drawing areas in a position of authority may be delicate. Others feel freer to draw, less preoccupied with what they display. Forest areas can be problematic and hard to outline when the canopy is very homogenous, and many activities take place in the same area.

## Edges

Participatory mapping requires people to draw lines, for example, to enclose particular areas such as land uses/land cover that have a specific and relevant use for them and are not always continuous. Although often fuzzy, land uses have edges. People in real life do not experience nor perceive space with high precision, but rather in a fuzzy way (McCall 2006). The depiction of current land use/land cover by the workshop participants, although fuzzy, calls for more precision than in both the past or future depictions of land, which are fundamentally perceptual and intangible. Participants were asked to fragment their world, to establish limits and edges, to somehow make a cubist hard-edged representation of their landscape. In real life economic activities happen in a delimited space, not just croplands or

houses that are easily measurable, but also routes where forest resources are gathered and special places that are visited for emotional reasons can be framed. Women from Nieves recall a place they used to visit for leisure purposes and natural beauty called La Peña (Map 1), however, the trail to access is now blocked by a private avocado orchard. In this regard, men say that now they have to travel to a nearby lagoon in the neighbouring community of Umécuaro. Furthermore, children in Tumbisca explain that the resin activity is not limited to resin (Map 28), but it rather entails a more complex forest use where people gathers different NTFPs on their way. Thereby, the spatial precision might not be as important for people's maps as is the precision of the content.

### Scale and quality

Maps give a general snapshot of the local situation, including important issues related to land use, and key places that are either already protected or need attention. The scale of the image, however, is of key importance since it enables or disables participants from locating or representing different information (McCall 2006). The scale of the images, 1:50,000 & 1:25,000, did not allow deeper information about certain areas to emerge. Women who develop and use mainly the settlement environment and nearby places where rural activities happen, such as backyard gardens, small *milpas*, and fruit trees, expressed the impossibility to represent more detailed information. The print quality is also important to help participants understand, locate and engage with the image.

### Superman view

The satellite image gives the standard ~~an alternative~~ “objective” vista of the landscape, wide and encompassing, what in photography is called an overhead shot. Current geographers, especially since GIS gained popularity, are used to analysing the landscape from such a zenithal sight, what Kenneth Olwig (2008) identifies as the “scenic” conception of the landscape, which evolved from the pictorial perspective and is essentially

representational and performable<sup>39</sup>. As is the case here, PM benefits from the bird's-eye view in photo-mapping to produce alternative new scenes. By using the participatory mapping technique, people learn a new tool and spatial skill as they interpret their homeland from this perspective of their land. The visualisation in a geographic language allows the information to be analysed in a spatial dimension. Nevertheless, some questions emerge:

- Is the bird's-eye view really the best way of showing people's views and expectations?
- What are the local meanings of the categories represented as material attributes – textures and colours- to which people feel attached?
- How could we integrate the aerial (vertical) and lived (horizontal) perspective of the landscape in a sort of superman view?

Superman fights both on the ground and in flight. It is not the intention to use this clumsy metaphor to conceive facilitators or map makers as superheroes, but rather to take the interesting change of perspective from ground to sky, which allows depth and detail as well as wideness, allowing zooming-in and zooming-out without placing one over the other. It is our belief that planning processes should enrich from both aerial and surface-dwelling views in order to encompass the complexity of the landscape. Mapping with the people can provide both the aerial (vertical) and the horizontal (lived) perspectives through visual interpretation by those who live in, and have direct experiential knowledge of, their landscape.

### Local and External

The advantages of working at a local scale with the actual users of the landscape are many for external agents, and also the communities themselves benefit from the recognition of their knowledge and interests. Such claims have been previously acknowledged by Blaikie

---

<sup>39</sup> “The space of the map, like that of the landscape scene, is an extent, with various objects plotted in terms of its coordinates. On the quadratic space of such a map life is enclosed within property boundaries” (p. 83)

et al. (1997) in what is called “knowledge negotiated” which recognises the synergistic knowledge that results from mutual construction between local and external agents. The mapping activity allows local people to share their knowledge under the recognition of being valuable for external purposes and by legitimising that what they know is important to others. Maps made by the local people are a strong source of information that can be entwined with external products – GIS, training materials, reports, scientific papers, etc., and other specialised knowledge produced in outside institutions. Although strong efforts are required, negotiating knowledge is a key factor in PLUP and in the contemporary pursuit to achieve a sustainable world. In the field, it was common to hear people underestimating their own knowledge, doubtful about having something to contribute.

Local knowledge, specifically spatial knowledge, is of clear importance in the unravelling of the landscape complexity. Land use maps are therefore incomplete and uncertain without local peoples’ involvement and active participation. Especially in rural environments, where the use of space is very dynamic, land and land resources are rarely used for a single purpose. In fact, land is lived and thus highly complex. Where resin is gathered, livestock also graze and people rest under a shade tree. What is visual in a satellite image hides deep information that can only be captured in a visual product by those who dwell in the landscape. Invisible attributes of the landscape, like expectations, can be visualised by active users and others. Such depth of information is valuable in frameworks such as PLUP and Natural Resource Management, which seek to deal with broad needs and agendas, like sustainability, through the organisation of local realities.

#### Expectations in the `future` map

Thinking about the future is a natural process of human behaviour that helps to anticipate and prepare for unknown situations. Placing *expectations* in a map is a good mechanism to visualise and crystallise plausible scenarios that work as a reference when planning for a future. Positive and negative expectations frame the extremes of the possibilities. They can be guidelines to choose the best option for the majority and to avoid harmful outcomes. The *expectations* maps are community products that should integrate as many voices as possible

in order to negotiate common and opposing interests, and represent local values and aspirations, although it should be done prudently not to create conflict.

Participatory mapping allows people to build future scenarios and project their fears, needs and desires in a visible and spatial way. P-mapping is inclusive – and efficient - since it can integrate a wide array of personalities, including optimistic, realistic, and pessimistic people, all on one plastic sheet. Even though the future is inherently uncertain and variable, exploring *possible scenarios* created by local agents gives a solid basis to manage and prevent negative change. People provide information concerning past experiences, aspirations, values, desires, motivations, needs, even rumours that intervene in possible transformations and enhance projections of future land use.

Taking the effort to represent and organise expectations might not be feasible for everyone. It seems that thinking about the future is a luxury overshadowed by current and more urgent pressures. Planning long-term needs involves investing time and energy which are often scarce resources in poor communities that survive on a day-to-day basis. ‘Planning’ and ‘doing’ appear to be paradoxical in terms of time restrictions, for planning involves stopping doing, and vice versa. In the same vein, P-mapping can be time-consuming and not very appealing to those whose work deliver immediate profit. How to make PLUP a more affordable process for people is not a trivial question.

## **The content of the landscapes**

### The moving landscape

Change is inexorable. Expectations are a clear representation of this. Land use change shall continue to happen. Likewise, life styles change and with them desires and aspirations. Economic trends, such as demand for avocado and mezcal, drive land use decisions that impact in the social sphere – disagreements, conflicts, dysfunctional organisation, and in the biophysical sphere – environmental pollution, biodiversity loss, ecosystem fragmentation. Inherited local values, on the other hand, may also push change away, resisting radical transformations and taking a more gradual change, though global forces

are strengthening over time. Expectations in Nieves indicate that radical change in terms of land cover, with all the environmental issues related, will strike. Map 16 illustrates that avocado orchards will take over *milpa* production and expand onto nearby forest areas. Children from Tumbisca think they will continue to have forest-based livelihoods, but anticipate patches of forest will be lost from wood extraction and clearing for agriculture, and also agave will substitute maize growing. Women in Laurelito feel that loss of forest will increase due to timber extraction and expansion of farming areas (Map 34).

The consequences of transforming the landscape are not necessarily negative, in fact, strategies that benefit social and ecological capacities are needed in order to mitigate and reverse environmental damage, or fuel sustainable strategies. It is imperative to understand change as a natural process and a human characteristic and potency that can be conceptually used for landscape enhancement and to fight globalisation. Through PLUP and strategy design, ideal landscapes have the potential to reroute decisions to a more balanced, peaceful and sustainable developed future by changing natural or previously disturbed areas responsibly, thus horrid landscapes avoided.

#### The marketing of the landscape: land sales and their impacts

If and when the inhabitants lose interest and reasons to remain as part of the contemporary rural reality and they seek fragile but functional and better-paid opportunities in the city, the new option emerges of selling their land. Selling land has become more common in some places. Nieves is one of them. Tumbisca, on the other hand, resists. People from Nieves, and surrounding areas, have begun selling their land wooed by wealthy avocado producers who see potential in their land, and offer attractive sums of money. The landscape thus, is inexorably altered through the aggregated effect of people's individual aspirations, and the collective empowerment over territory and landscape is loosened. On the contrary, Tumbisca's collectiveness has triumphed over external attempts to buy land.

Owning land is holding power, hence, transferring land means losing the power of the landholding, exchanging it for a more ephemeral capital that can vanish quite fast. Selling land has different negative effects, one of them being the break-up of the social community



organisation. The conflicts between internal aspirations leads to a cracking of the community's traditional social structure and to divergent interests which reduce social capital and increase vulnerability, including the use of common lands. Key informants from Nieves exemplify this situation when they speak about "newcomers", with whom they have no communication, and are not interested in preserving the old ways, but, on the contrary, "just want their truck to be riding around". Trucks are a symbol of economic status and masculine power in rural areas in Mexico, particularly among the young. As they say: "the father dies, the son inherits the land, and he receives a nice truck from an avocado producer and some money". Those who hold capital have the opportunities to expand their spatial dominion.

The loss of a sense of place, which is intimately related to the meaning and the purpose of land, should be recognised as an important driver and reason to abandon home or to give away the family property. Those who struggle to stay have to face new issues involving external actors, "newcomers", who buy land and have a different cultural belief system and more financial capacity. Inequality worsens: community members previously living in poverty need to deal with new powerful owners unattached to local values. Avocado monoculture, the biggest driver of change, is a land use change that brings cultural change and loss of some traditional local values associated with the forest and *milpa*.

Furthermore, other activities such as NTFP gathering, pasture lands, or visiting recreational places can become obstructed by physical barriers, such as fences: "orchards block and affect extensive livestock farming". Newcomers arrive with productive ambitions and enough money to build infrastructure and to hire people to work their crops. Strangers with strong financial capacity represent a new rural livelihood that can profit from agriculture. Due to the difficulty to compete in the global food market, the existing community members may find working in foreign lands more profitable, rather than risking a whole harvest to be lost, thus their land is cultivated mainly for subsistence purposes. Such situations propel inequality and, with time, those living in a poor situation become even more impoverished, in some cases even pushed to sell their land.

Women from Nieves long for better conditions and employment opportunities so that their families stop migrating to the United States. Unemployment and modern lifestyles pull

people to the cities, and those who migrate set up another complex dynamic of urbanisation. Landholders in Tumbisca argue that the children have to look for opportunities elsewhere because of lack of options at home. However, they believe that paving the main road would allow the people to travel daily to the city of Morelia to work, and continue living in Tumbisca. Rural land, as shown by Rubio (2006), would shift from being a means of production, to being a place to live, as shelter. However, migration to nearby cities and to the U.S.A. involves a greater physical and emotional detachment from the land and opens a window to consider selling land or to migrate definitively. In fractured places like Nieves, people are leaving their homeland and new wealthy people are acquiring big pieces of land and devoting them to intensive farming. No PLUP exists and decisions are made in a disorganised way, divided by people's polarised ambitions.

### Landscapes of fear

Fear is part of everyone's daily living, thus a quality of the landscape. "Rural people are exposed to the rough as well as the gentle side of nature", says Tuan (2013, p. 140). It is true that nature provides "free" goods and services to the people, but it can also be destructive. The ambivalence of the power of nature is undeniable, and it is those living in the countryside that experience nature's temperament directly.

Moreover, historically, land distribution and ownership have been dynamic and uncertain, making the possibility of losing land as a primary concern<sup>40</sup>. Participatory mapping allows the depiction of immediate, current, and future spatial threats and fears that are not always visible, or sometimes not known, to external parties. Frost or drought, pollution of soil and springs, changes in the land tenure, forest pests, falls in agricultural prices, fires, deforestation, loss of recreational places and trails blocked by fences, to name a few. Representing fears in maps works well in PLUP, since PLUP helps locate areas that are perceived as vulnerable in a sort of way, and place attention on them to prepare for or avoid

---

<sup>40</sup> "Peasants in ages past lived in anxious fear that they might lose their land and certain vestigial rights, such as pasturage on the commons. Landless farm workers had no certainty of employment: they could be let go [...] And they could be dismissed upon the whim of the farmer" (Tuan 2013, p. 141).

negative consequences. Young men in Tumbisca detect specific forest areas susceptible to pests and fires (Map 23). The depiction of horrid landscapes outlines the limits of what should be avoided. Examples of this are mapped areas that could be subject to deforestation in Nieves (Map 18), as well as the desiccation of water bodies that would bring environmental restraints. As for women in Laurelito, they are worried about possible damages that visitors could bring to their land (Map 36). Strategies to stop the community from falling into such scenarios work as a motivation to organise, make community decisions, and guide landscape planning.

### Landscapes of rural poverty and globalisation

Poverty and lack of economic opportunities are the main issues that hinder rural development. Rural communities, frequently with high indices of marginalisation, are overpowered by stronger and unknown global processes they do not fully understand, because they are marginalised, and often isolated from education, health, communications, technology and politics, and relegated from decision making. As Doreen Massey suggested in 1991, weak groups get “imprisoned” and controlled by stronger global forces. Globalised prices of agricultural goods create an unfair competition with small rural producers from underdeveloped countries (Rubio 2006), in conjunction with unfavourable national agricultural policies after the North American Free Trade Agreement (Orozco-Ramírez et al. 2017): “De-territorialised global capital is now setting the prices and generating a de-structuring dominion [...] The conditions of subordination and the ruin of the producers are fixed abroad, outside the territory...” (Rubio 2006, p.1050). Substitution of traditional maize and *milpa* to grow avocado in Nieves and agave in Tumbisca were mentioned during the mapping. Key informants from Nieves think that safeguarding traditional agriculture under traditional use would prevent the next generation from having to work other people’s land.

Livelihoods are changing as a consequence of globalisation which is manifested in the materiality of the landscape. Physical change is sculpted through either complete abandonment of farming activities or changes in the types of crops. “The rural life

archetypes that once were the agricultural plot and the *milpa* are now substituted by migration and precarious paid work” (Carton 2009). The classical rural reality shifts from primary production based mainly on local resources, to temporary or permanent migration to cities seeking jobs, as in the case of Tumbisca.

Migrants generally search for opportunities in the tertiary sector, as a consequence of the free market economics which open up competition in the primary sector with lower prices fixed by industrialised countries, or very productive countries like China, forcing the local prices to drop and the most disadvantaged of the rural population to be more impoverished (Rubio 2006), hence, pushing people to abandon traditional and un-market competitive rural activities, and try luck elsewhere. The resulting landscapes, which Milton Santos (1990) would describe as derived from more powerful external interests, bring not only land cover changes but new livelihoods, and with them, new social and economic challenges, and political and environmental issues. Obstruction of traditional activities such as blocked paths that isolate pasture lands may not have visual prominence, but are sure important landscape changes in the daily routines of extensive livestock farmers.

Globalisation is an external stimulus that increases the already existing rural poverty, which leads not only to a decrease in primary production as an income source, but can also lead to the loss of interest and values related to the rural life: thus, a local devaluation of the traditional Mexican rural landscape. Emotional detachment from the land results in an abandonment of traditional rural knowledge and cultural traditions, along with the search for new urbanised lifestyles. The rural lifestyle is devalued and unappreciated, and many times perceived as “underdeveloped” in market-oriented thought. Poverty and remoteness experienced in rural areas affect the perceptions of the usability and the value of their land to the extent that people migrate and sell their land.

The social and political context affects LU planning processes, especially when “participation” is added to make PLUP. Opposing internal interests frequently arise and are difficult – or wrong - to conciliate from the outside, but need to be addressed. Expectations fall into a negative and pessimistic future, mainly driven by disempowerment and the inability to deal with global forces. It was common to find that peoples` expectations are subject to many external forces, such as government decisions and financial aid, which can

lead to dependence and lack of autonomy. Men in Nieves believe that the existing financial support from the government is insufficient to have good job opportunities, infrastructure improvements, basic services, farming technology to work the land more efficiently and better compensations for preserving the forest, which are the main issues hampering their development. Similarly, women from Laurelito think that having governmental assistance for the production of fruits and vegetables would improve their community. At the national level, government policies have failed to favour the rural poor by not encouraging an economic reappraisal and protectionism of local products, but on the contrary, continue to promote a neoliberal production system.

In such a panorama, we believe a strengthening of the sense of *place* could benefit the continuance of rural communities. It is in *place* that we give meaning to the world and to our own lives; it provides the tranquillity of knowing a particular space as we know ourselves, and it is too where we reflect upon our world (Tuan 1975; Relph 1997; Nogué 2014). We are rooted to place through experience and historical memory. When global phenomena can feel unbearable, place is a trench. Fears are battled in place. Having strong linkages with place would increase the energy and wilfulness to defend the land. Sharing a collective meaning and value of place is a means to empowerment and to reach local aspirations. Meaningful natural environments as places are also important in ecological conservation and natural-resources-based economies.

#### Landscape as locally controlled forest

Rural landscapes need to be productive in order to be preserved. People need income to get amenities. New ways of production, that integrate traditional knowledge with technology and that make an important increase in their income, are needed nowadays. In Mexico 80% of forests are under communal property (FAO 2004), and, although it is one of the products of the Mexican Revolution, the national forest code makes it difficult for *campesinos* to manage their forests with autonomy. Forest policies and programmes mainly focus on reforestation, forest plantations and conservation instead of promoting local sustainable production strategies that would provide benefits, economically, environmentally and even

emotionally. The Mexican State, guided by a capitalistic ideology and neoliberal economic project, let the local people absorb the costs of protecting the forests as if they were solely responsible for the health of the country ecosystems, and as if they had no ambitions and desires of having better or different lifestyles, or even worse, the right to have them. Moreover, urbanites, distanced from what living in nature entails, freely and blindly benefit from them, and even demand the preservation of forests as if forests were uninhabited, unproductive, and neutral. Until a cost internalisation of the whole complexity of environmental services produced through forest conservation and the subsequent just compensation is achieved, forest communities will continue to unfairly carry the burden of direct responsibility. Also, reducing the consuming patterns and spreading what Herrero (2016) calls an *ecological alphabetization* in the cities are of critical importance. Sustainable production initiatives and provision of alternative livelihoods could lead to a rethinking of external and local attitudes towards conservation. Payments for Ecosystem Services (PES) are one of the economic instruments that have been designed to tackle this situation by rewarding those who protect, conserve or restore forests with monetary compensation. One of the underlying problems of PES is that, far from seeking a true valuation of nature's complexity, the policy only adapts to the capitalist economy by internalizing ecosystem services in a very narrow way (Kosoy & Corbera 2010). In Mexico, the payments have been normally calculated based on the opportunity cost of turning forests into maize fields (FAO 2013). However, in places like Nieves, where the main threat of deforestation is avocado production, such payment is too far from being adequate. Possibly, PES would improve its functioning if designed under a participatory and place-based analysis, where people could discuss and argue the just compensation for changing their livelihoods to forest guardians.

#### Landscape: the dichotomy of nature

There is an active concern about negative effects on ecological services – decrease in water availability, increase in fires and forest pests, variability of rain regime, contamination, deforestation, etc. that impact land use suitability and performance. Nature is perceived by the community participants as broadly dichotomous, both as an environment that should be

protected and preserved because it provides ecological services and a sense of place, and as productive land for human use; hence, is paradoxical and controversial. People in Nieves wish to preserve the forest, but find blueberry orchards attractive. In Tumbisca, they want to have a healthy forest so that they can continue producing resin, but more land is being shifted to agriculture partly under global marketization effects.

Caring about nature in its dual essence and complexity is of great importance in the planning of sustainable futures and in the framework of international environmental agendas, where the positive health of the natural environment is recognised as playing a key role for community development. Women and the young showed a strong concern about restoring the natural environment, but also expressed their worries regarding the lack of working opportunities. The *ideal* map (Map 24) pictured by boys of Tumbisca shows such a complexity: many areas indicate an interest to have more forest and resin production, but other areas outline the desire to have more agave growing and livestock. Women from Laurelito mention the importance of having *milpa* agriculture and forest management, and, notwithstanding, they also detect that current practices bring ecological problems, especially related to pollution, depletion of water bodies and soil erosion (Maps 32 and 34).

### Participatory Land Use Planning

The recognised need to truly integrate local people into the land use planning process is not reflected in any cohesive communication between government objectives and local needs. The local feeling is of abandonment, of omission, of being left behind. There is a deep abyss between local communities and the government organisations which the communities feel are more concerned with making political propaganda and completing short-term projects, e.g. reforestation programmes, in which the government provides plenty of trees, but the projects are not followed-up. Communities feel that government agencies do not engage with participatory processes, or, they do so only as a means to satisfy international environmental agendas. Furthermore, the disintegration of social organisation in communal lands due to differing interests is an outcome of capitalist market thinking and

individualisation, based on the globalised economic culture that prizes wealth accumulation as an end in itself, and penetrates into rural communities through space-time compression.

P-mapping is a tool with the scope to nurture PLUP by spatially assessing the local realities as well as considering local knowledge. Producing a participatory cartography of detailed land use and *landscape expectations* shows the benefits of including local users in the mapping activity, and the importance of having valuable local information in order to achieve a more consistent planning and use of the territory. The maps that resulted from this research can work as a first step for PLUP, thus, as a broad diagnosis. Map 18 integrates *fears* from different groups in Nieves, which relate to land use change, deforestation and water scarcity, and alert of particular places susceptible to change. Map 17, on the other hand, provides potential guidelines to be taken as starting point in the formulation of sustainable strategies, where reforestation and diversification of the whole landscape production system are wanted. Continuation is needed since PLUP should be a much more complex and longer process that should aim to become locally owned and iterative. More interdisciplinary work is needed in order to strengthen this research and, in conjunction with the local people, design specific lines of action that are economically efficient, culturally compatible and ecologically respectful. Intermediation from NGOs and academic institutions in project design to apply for governmental financial aids would also be positive.

### The Utopian landscape

It becomes urgent to visualise the *Utopian landscape* when the *expected landscape* is actually dystopic and hopeless, or, at least pessimistic: people from Nieves fear their homeland will shift to a homogeneous and polluted avocado landscape in conjunction with illegal logging, a decrease in agricultural production, and in- and out-migration. Nieves' inhabitants wish for, on the other hand, a productive and diversified landscape, where forests are suppliers of raw materials and ecological services, farming continues under the traditional mainly subsistence *milpa* system, and some avocado is produced – but not as a dominant monoculture (Map 17). Nowadays, the *Utopian landscape* is closely bound to the



idea of the sustainable landscape, which is, in essence Utopian, as the world is always facing change. Most important is the question posed by Antrop (2006): “sustaining what?” To this, we can add the question, “how to sustain the landscape without restricting community improvement and development, which are also wished for?”

Life-styles change and so do landscapes and Utopias and expectations. Material and cultural elements give identity to places and, thus, changes need to be shepherded to keep landscapes from definitive negative transformation. Modernity has shown a strong power to culturally homogenise places, although, at the same time, the reactions and resistances of people to its onslaught has revitalised communities and cultures to try to differentiate themselves from others, and to reaffirm their identity through alterity, adding a special value to localisms (Nogué 2006b). Revaluation of local resources under sustainable modes of production is a way to actually benefit from the global capitalistic system, where monetary value is added to products branded with distinctiveness. Local identification of the material attributes and social attitudes that are representative of a place and are considered as important to maintain, are relevant when designing ideal futures - in plural, for Utopia is not restricted to one possibility. Multiple visions are needed to carve a pleasant future; above all, youths' expectations are of key importance in order to frame what a Utopian sustainable landscape will look like. Helpfully, young people are enthusiastic about participatory processes, although some might consider leaving the community in the future. Both, reasons to stay and to migrate are of great importance in the reinforcement of the rural livelihoods. Moreover, the elderly can provide particular traits through memories, stories, knowledge and rites to increase local distinctiveness.

## CONCLUSIONS

During this research we were able to do eight workshops and work with different groups of people from three different rural communities, which crystallised in 36 maps. All of the maps are products of dialogue, interchange of ideas and learning between members of each community, and the external group that facilitated the activity. We were able to fulfil our main purpose, which sought to encourage the local people in the making of maps, considering different periods of time and changes over time. Local knowledge, memories, interests, aspirations, fears and desires played a key role in the design of future landscape scenarios. We tested the Participatory Mapping methodology with positive outcomes. The resulting maps have relevance for the registry of local knowledge and, particularly, in terms of future expectations. Furthermore, if so desired, the maps are products that can be included in Land Use Planning, or work as foundation stones to build on. Local schools can also benefit from the maps both in the understanding of their community and by inspiring new ideas to be added; interest the young in the planning exercise.

Forest pests are one of the main problems. Years ago it was rare to have pests, now they are everywhere. “They eat the juice from the heart of the tree until it dries”. – Man from community of Tumbisca.

Changes in the landscape were easily identified by the local users, in particular those related to land cover transformations from a more natural setting to a more or completely humanised landscape, e.g. forest conversion to agriculture, changes in rainfall patterns and presence of pests. Other changes that are less evident or have no visual evidence at all in satellite images were marked as important, with social and cultural impacts. Expected changes are mainly related to strong economic forces that are already present, but will most probably increase. Deforestation and monoculture are two of the main expected changes that have the potential to transform the remaining forest-based livelihoods. Furthermore, pollution of nature and the decrease of forest resources were mentioned. Such changes, driven by mechanisms of capitalist economics, are promoted especially by those holding financial capital. In a broad sense, the expectations of the local respondents are mostly pessimistic concerning their natural systems and social equity, and thus they are apprehensive of future unsustainable situations.

Contrary to the national and international agendas that advocate for sustainable futures, local communities expect negative changes to come.

Current expectations indicate that landscapes are most likely moving towards a feared scenario. *Fears* are broadly related with the selling of land, forest loss, environmental depletion, lack of job opportunities and economic growth. By comparison, *ideals* have to do with increasing the forest cover and the community management of forests, enhancing the natural environment, more job opportunities, and receiving more government support for economic development. *Realistic changes* however, as mentioned above, point towards agricultural expansion promoted by individualisation of landholdings. Interestingly, current expectations align better with *fears*, whilst *ideals* match with the past. When talking about the future of their landscape, peoples' attitudes were frequently those of worry and hopelessness.

In a broad sense, men are more concerned with production and economic profit, and the preservation of land and natural resources so that future generations inherit a fruitful basis for development and have the possibility of benefiting from the landscape. On the other hand, women showed a more balanced view between economic production, social welfare and environmental care. The extent of spatial knowledge and concerns about boundaries also vary between genders; men usually have greater mobility since they work in the field and travel to neighbouring communities or to the city, whilst women take care of the household and spend more time at home, although some walk long distances in forest lands to participate in NTFP gathering. Knowledge about the territorial boundaries is stronger in people who have served as local authorities, usually men. The children are mostly worried about their future, which they anticipate will bring plenty of difficulties, particularly in terms of employment and economic opportunities. However in their ideal landscapes, children picture a more natural place with better environmental quality – more forest, clean air and water, and more importantly, a place where they could live with a good quality of life. Dreaming and making “dream maps” of ideal futures has been described as an important phase in PLUP, in the exploration of possible futures (FAO, 2009).

“There used to be a spring. The river was bigger and had frogs and axolotls. Springs had more water and water was cleaner”.

“There were plenty of wild berry shrubs but not anymore. They cut the shrubs to put the avocado orchards”

Avocado growing is the most sensitive phenomenon for people in Nieves. People in Tumbisca however, are mostly worried about forest risks such as pests and fires. Women in Laurelito are preoccupied with ecological problems related to agriculture expansion and the loss of forest. All groups in

all three of the communities coincide on four fundamental things: 1) nature is being depleted by human action, particularly through land cover change, and the effects on ecological services degradation are negatively sensed; 2) forest areas are being changed and will continue to change in order to increase agricultural land, thus people who rely on forest resources have to travel greater distances to gather firewood and NTFP, jeopardizing the access of small-scale collectors to forest products (Delgado *et al* 2018); 3) the lack of well-integrated sustainable economic opportunities in the context of an unfair neoliberal capitalist system that allow the enrichment of the minority who owns the capital is one of the core issues that fuel negative transformations to the landscape: forest loss, ecological pollution, migration, selling of land, individualisation and social disorganisation, undermining the sense of place, among others; 4) the past is remembered with nostalgia as a better place in terms of local traditions and natural abundance, although improvements of basic services in the localities are seen as good progresses, such as roads, schools and water infrastructure; notwithstanding that these still need to improve in quality.

The results show that powerful global forces are thrusting important changes on the landscape, such as shifting to avocado cultivation in community of Nieves, and agave plantations in Tumbisca. As mentioned, changes in the landscape are not just material or structural, but also cultural, hence, physical changes involve simultaneously a different way of living. Globalisation, along with roads and better connectivity to the city, and traditional farm goods depreciation – maize and bean – in contrast with highly valued products as avocado, bring urban lifestyles to the rural environment. People are abandoning traditional farming activities to try new ones or

“We have talked amongst landholders, but there are lot of new people that come with new thoughts. The father dies, his son inherits the land, and he receives a nice truck from an avocado producer and some money”. “New ones don’t want to preserve the old ways. They just want their truck to be driving around”.

looking for temporary work in the tertiary sector in the city. Although agrarian Mexican history has significant influence on how the land is valued, because it incarnates ideas related to victory over land ownership and legacy, and certainly some people are profoundly rooted, recently land has experienced a loss of value to the degree that some people prefer selling or leasing over working it. Migrating to the city, whether temporarily or definitively, is thus an alternative. On the other hand, those who resist change are motivated by a strong sense of place that emerges from significant memories and a deep care for their homeland.

Approaching the people to hear and register in a spatial form some items of their landscape knowledge, proved to be of key importance to acknowledge the complexity of the local rural realities, although more in-depth research is definitely needed. Participatory Mapping provided an important framework to achieve the spatialization of local expectations regarding the land cover and land use of the landscape. General ideas also come in an oral form - interviews and informal discussions - and are evidence of how the local landscapes are performed. Unexpected situations such as land conflicts, time availability to participate in low-budget projects, difficulty to understand satellite imagery and reluctance to draw hard-edge lines with social and political significance can alter the methodological objectives, and flexibility to adapt questions and purposes is certainly recommended. Local participation unravels the complexity of the landscape, adding human character – many times ambivalent – to objective forms and patterns. For example, the juxtaposition of different agricultural forms translates into adjacent human interests –many times conflicting –, and, even further, into anxiety of losing land and local practices or cherished livelihoods. It can lead to courage or despair, to a *topophilia* where de-humanised objective areas become humanised, or to a detachment from place.

The women and the young were particularly enthusiastic during the mapping activity, and had no trouble drawing imaginary attributes, perhaps because they usually have more “free time” and less responsibility over land boundaries. We also find that people can locate their wishes and fears on satellite images, and make them visible by detecting the areas they would like to change or preserve – e.g. reforestation and agriculture maintenance -, activities that could pose risks – e.g. avocado production in Nieves and tourism in

Laurelito-, and different scenarios to anticipate possible change and to decrease uncertainty about the future – e.g. specific areas more susceptible to change to avocado in Nieves or to fires in Laurelito.

In terms of methodological performance, the main differences recognised are the level of interest to participate in non-profitable projects, These activities are less appealing to the men who have the responsibility for the earning the majority of household income, less time availability, and less confidence to draw hard lines – which potentially could become boundaries - to create meaningful areas in a map. Women showed more confidence in drawing attributes, whilst men preferred to express themselves in an oral fashion. Children have profound knowledge about the current situation and they contribute with fresh aspirations and particular needs which could be great value for PLUP, such as their wish to preserve forest-based livelihoods, increase forest cover and recover natural resources whilst at the same time have economic opportunities and progress (Boys and girls from Tumbisca and Nieves; Maps 10, 24 and 31).

Local depiction of past, present and future land use information is important and useful for PLUP. In an exploratory phase, land use mapping allows people to remember – the elderly in particular, to recognise current issues, and to wish and imagine alternative scenarios. Perceptions showed that general global, as well as local, issues can drive local expectations. In a PLUP framework, in which the local people should participate in the organisation of space and in how such space should be produced, past and present maps can nurture the phases of inventory and evaluation, and future maps can help in the demarcation of (spatial) planning objectives and strategies. Mapping expectations promotes imagination and curiosity that continue to unfold even after the sessions, and thus the process does not end with the map but rather continues at a conscious level. Expectations change and renew with time.

## **FUTURE RESEARCH**

A place-based approach that examines in more depth the local meanings of the landscape and the factors that condition livelihoods in the land should provide relevant knowledge. What does it mean to live in Nieves or Tumbisca or Laurelito? What are the local meanings of the forest, the *milpa*, the water bodies and the avocado orchards, and how is that helpful in the (P)LUP process? Is the cuisine with *milpa* products a strong reason to maintain the *milpa* system, and for migrants to return home? What are the local values assigned to their land? How do old-timers' and newcomers' meanings contrast? How is the landscape differently experienced within and between groups with competing (or shared) interests and, thus, how does it respond to different needs and desires? It is imperative to understand natural resource users as dwellers of certain places with emotional, cultural, historical, and specific personal consciousness to their local material world, in order to design local natural resource politics and PLUP (Cheng et al. 2003). Exploring sense of place is one approach to evaluate why some people decide to sell their land and others resist, or, to worry about a rapid changing landscape that threatens future potential use, and their memories and personal satisfaction.

## REFERENCES

- Adger, W.N., 2006. Vulnerability. *Global Environmental Change*, 16(3), pp. 268–281.
- Aitken, S.C. and Kwan, M.P., 2010. GIS as qualitative research: Knowledge, participatory politics and cartographies of affect. *The SAGE Handbook of Qualitative Geography*, pp. 287-304.
- Alcorn, J.B., 2000. Keys to unleash mapping's good magic. *PLA Notes*, 39 (2), pp. 10-13.
- Álvarez-Gordillo, G.C., 2011. *Educación y Gestión del Riesgo de Desastres: Procesos educativos en la Cuenca Alta Grijalva*, México: Tlapalabrería Ediciones.
- Amler, B. Betke, D., Eger, H., Ehrich, C., Kohler, A., Kutter, A., von-Lossau, A., Müller, U., Seidemann, S., Steurer, R. and Zimmermann, W., 1999. Land use planning methods, strategies and tools. *Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH*.
- Antonsich, M., 2011. Rethinking territory. *Progress in Human Geography*, 35 (3), pp. 422-425.
- Antrop, M., 1998. Landscape change: Plan or chaos? *Landscape and Urban Planning*, 41 (3-4), pp. 155-161.
- Antrop, M., 2000. Background concepts for integrated landscape analysis. In: *Agriculture, Ecosystems and Environment*. pp. 17–28.
- Antrop, M., 2005. Why landscapes of the past are important for the future. *Landscape and Urban Planning*, 70 (1-2), pp. 21–34.
- Antrop, M., 2006. Sustainable landscapes: Contradiction, fiction or utopia? *Landscape and Urban Planning*, 75 (3–4), pp. 187–197.
- Appendini, K., 2010. Economic liberalization, changing livelihoods and gender dimensions in rural Mexico. *FAO, IFAD and ILO Report Gender Dimensions of Agricultural and Rural Employment: differentiated pathways out of poverty Part III Rome: FAO, IFAD and ILO*.
- Bachelard, G., 2013. *La Poética del Espacio*, D.F.: Fondo de Cultura Económica.
- Barsimantov, J. & Navia Antezana, J., 2012. Forest cover change and land tenure change in Mexico's avocado region: Is community forestry related to reduced deforestation for high value crops. *Applied Geography*, 32 (2), pp. 844–853.
- Blaikie, P., Brown, K., Stocking, M., Tang, L., Dixon, P. and Sillitoe, P., 1997. Knowledge in action: local knowledge as a development resource and barriers to its incorporation in natural resource research and development. *Agricultural Systems*, 55 (2), pp. 217–237.
- Borrini-Feyerabend, G., 1997. *Beyond Fences: Seeking Social Sustainability in Conservation*. Switzerland: IUCN.



- Brown, G., 2004. Mapping Spatial Attributes in Survey Research for Natural Resource Management: Methods and Applications. *Society & Natural Resources: An International Journal*, 18 (1), pp. 17–39.
- Campos, M., Velázquez, A., Verdinelli, G.B., Priego-Santander, Á.G., McCall, M.K. and Boada, M., 2012. Rural people's knowledge and perception of landscape: A case study from the Mexican Pacific Coast. *Society & Natural Resources*, 25 (8), pp. 759-774.
- Carton de Grammont, H., 2009. La desagrarización del campo mexicano. *Convergencia*, 16 (50), pp. 13-55.
- Cavendish, W., 2000. Empirical regularities in the poverty-environment relationship of rural households: Evidence from Zimbabwe. *World Development*, 28 (11), pp. 1979–2003.
- Chambers, R. & Conway, G.R., 1992. Sustainable rural livelihoods: Practical concepts for the 21st century. *Institute of Development Studies, Discussion Paper*, 296, pp.1–42.
- Chambers, R., 1994. The origins and practice of participatory rural appraisal. *World Development*, 22, pp.953–969.
- Chambers, R., 2006. Participatory mapping and geographic information systems: Whose map? Who is empowered and who disempowered? Who gains and who loses?. *The Electronic Journal of Information Systems in Developing Countries*, 25(1), pp.1-11.
- Chapin, M., Lamb, Z. and Threlkeld, B., 2005. Mapping indigenous lands. *Annu. Rev. Anthropol.*, 34, pp. 619-638.
- Cheng, A.S., Kruger, L.E. & Daniels, S.E., 2003. “Place” as an Integrating Concept in Natural Resource Politics: Propositions for a Social Science Research Agenda. *Society & Natural Resources*, 16 (2), pp. 87–104.
- Claval, P., 1999. Los fundamentos actuales de la geografía cultural. *Documents d'Analisi Geografica*, (34), pp. 25–40.
- CONAFOR, 2001. *Programa Estratégico Forestal para México 2025*. Comisión Nacional Forestal.
- CONAPO, 2010. *Índice de Marginación por Localidad 2010*. Consejo Nacional de Población.
- Corbett, J.M. & Keller, C.P., 2004. Empowerment and Participatory Geographic Information and Multimedia Systems: observations from two communities in Indonesia. *Information Technologies and International Development*, 2 (2), pp. 25–44.
- Corbett, J. and Keller, P., 2006. Using Community Information Systems to communicate traditional knowledge embedded in the landscape. *Participatory Learning and Action*, 54 (1), pp. 21-27.
- Cornwall, A., 2008. Unpacking ‘Participation’: models, meanings and practices. *Community Development Journal*, 43 (3), pp. 269-283.

Cosgrove, D., 2002. Landscape and the European sense of sight: eyeing nature. In: K. Anderson et al., eds. *Handbook of Cultural Geography*. London: SAGE Publications, pp. 249–268.

CRM, 2015. *Informe 2015* [online]. Available at: <http://crm.org.mx/PDF/INFORMES/INFORME2014.pdf> (Accessed 27 September 2015).

Dardel, E., 2013. *El Hombre y la Tierra: Naturaleza de la Realidad Geográfica*, Madrid: Editorial Biblioteca Nueva.

Debolini, M., Marraccini, E., Rizzo, D., Galli, M. and Bonari, E., 2013. Mapping local spatial knowledge in the assessment of agricultural systems: A case study on the provision of agricultural services. *Applied Geography*, 42, pp. 23-33.

Delgado, T.S., McCall, M. K. and López-Binquíst, C., 2016. Recognized but not supported: assessing the incorporation of non-timber forest products into Mexican forest policy. *Forest Policy and Economics*, 71, pp. 36-42.

Department of Geosciences and Natural Resource Management University of Copenhagen, n.d. Landscape Futures [online], Available at: <http://fremtidenslandskaber.ku.dk/english/landscape-futures/>

Di Gessa, S., Poole, P. and Bending, T., 2008. *Participatory Mapping as a Tool for Empowerment: Experiences and Lessons Learned From the ILC Network*. Rome: ILC/IFAD, 45.

Di Gregorio, A. and Jansen, L.J.M., 2000. *Land Cover Classification Systems—Classification Concepts and User Manual for Software Version 1.0*. Rome: FAO.

Dolman, P.M., Lovett, A., O’Riordan, T. and Cobb, D., 2001. Designing whole landscapes. *Landscape Research*, 26 (4), pp. 305-335.

Duncan, N. and Duncan, J., 2010. Doing landscape interpretation. *The Sage Handbook of Qualitative Geography*, pp.225-247.

Elden, S., 2010. Land, terrain, territory. *Progress in Human Geography*, 34 (6), pp.799-817.

Elden, S., 2011. Territory: Part I. In: J. Agnew & J. S. Duncan, eds. *Human Geography*. West Sussex: Blackwell Publishing, pp. 260–270.

Fagerholm, N. and Käyhkö, N., 2009. Participatory mapping and geographical patterns of the social landscape values of rural communities in Zanzibar, Tanzania. *Fennia-International Journal of Geography*, 187 (1), pp. 43-60.

Fagerholm, N., Käyhkö, N., Ndumbaro, F. and Khamis, M., 2012. Community stakeholders’ knowledge in landscape assessments—Mapping indicators for landscape services. *Ecological Indicators*, 18, pp. 421-433.

FAO & UNEP, 1997. *Negotiating a Sustainable Future for Land*, Rome: Food & Agricultural Organization and United Nations Environment Program.

FAO & UNEP, 1999. *The Future of Our Land: Facing the Challenges*, Rome: Food & Agricultural Organization and United Nations Environment Program.

FAO, 2004. *Estudio de Tendencias y Perspectivas del Sector Forestal en América Latina al Año 2020: Informe Nacional México* [Online]. Retrieved from <http://www.fao.org/docrep/006/j2215s/j2215s04.htm>

FAO, 2009. Mapping our community's future: why and how to practice participatory land-use planning. In *Sustaining Communities, Livestock and Wildlife: A Guide to Participatory Land-Use Planning*. Rome: FAO, pp. 1-10.

FAO, 2013. *Forest Conservation in Mexico: Ten years of Payments for Ecosystem Services*, Rome: Food & Agricultural Organization.

FIFONAFE, 2010. Gerenciamiento de Núcleos Agrarios: estructura de ejidos y/o comunidades [online]. Available at: <http://www.fifonafe.gob.mx/gerenciamiento/sec.php?id=28> (Accessed 03 April 2017).

Flores, L.M., 2011. Mercado de tierras ejidales y cambio sociocultural en la Sierra de Santa Marta, Veracruz. *Estudios Agrarios*, 49 (17), pp. 129-153.

Folke, C., 2004. Traditional knowledge in social-ecological systems. *Ecology and Society*, 9 (3), p. 7.

Foro Ciudades para la Vida, 2002. *Gestión Comunitaria de Riesgos*, Lima: FCV.

Frankfurt, H.G., 1984. Necessity and desire. *Philosophy and Phenomenological Research*, 45 (1), pp. 1-14.

García, E., 1998. Climas, escala 1:1000000. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México.

Geist, H.J. & Lambin, E.F., 2002. Proximate Causes and Underlying Driving Forces of Tropical Deforestation. *BioScience*, 52 (2), pp.143-150.

Gobierno de la República. n.d. *Plan Nacional de Desarrollo 2013-2018* [online]. Available at: <http://pnd.gob.mx/> (Accessed: 09 June, 2016).

González G, S., 2014. Aumenta 140% producción de mezcal en México entre 2012 y 2013, *La Jornada*, 28 November [online] Available at: <http://www.jornada.unam.mx/ultimas/2014/11/28/aumenta-140-produccion-de-mezcal-en-mexico-entre-2012-y-2013-3894.html>

Greider, T. & Garkovich, L., 1994. Landscapes: The Social Construction of Nature and the Environment. *Rural Sociology*, 59, pp. 1-24.

Harley, J.B., 1987. The map and the development of the history of cartography. In *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*. Chicago: The University of Chicago Press, pp. 1-42.

Herlihy, P.H. & Knapp, G., 2003. Maps of, by, and for the peoples of Latin America. *Human Organization*, 62 (4), pp. 303–314.

Herrero, Y., 2016. *Una Mirada para Cambiar la Película: Ecología, ecofeminismo y sostenibilidad*, Ediciones Dyskolo.

Hooke, R.L., Martín-Duque, J.F. & Pedraza, J., 2012. Land transformation by humans: a review. *GSA Today*, 22 (12), pp. 4–10.

Houghton, R.A., 1994. The worldwide extent of land-use change: In the last few centuries, and particularly in the last several decades, effects of land-use change have become global. *BioScience*, 44, pp. 305–313.

IFAD, 2009. *Good Practices in Participatory Mapping: A Review Prepared for the International Fund for Agricultural Development*, Rome: IFAD.

IFAD, 2014. *How to Do Participatory Land-Use Planning*, Rome: IFAD.

INEGI, n.d.[a]. Catastro de la Propiedad Social: Antecedentes [online]. Available at: <http://www.inegi.org.mx/geo/contenidos/catastro/presentacionpropiedadsocial.aspx> (Accessed 01 March 2018).

INEGI, n.d.[b]. Carta Edafológica Serie II, escala 1:250000, Morelia E14-1. INEGI.

INEGI, n.d.[c]. Glosario [online]. Available at: <http://www.beta.inegi.org.mx/app/glosario/default.html?p=cae2007> (Accessed 9 January 2017).

INEGI. 2010. Población rural y urbana [online]. Available at: [http://cuentame.inegi.org.mx/poblacion/rur\\_urb.aspx?tema=P](http://cuentame.inegi.org.mx/poblacion/rur_urb.aspx?tema=P) (Accessed 03 April 2017).

Kalibo, H.W. and Medley, K.E., 2007. Participatory resource mapping for adaptive collaborative management at Mt. Kasigau, Kenya. *Landscape and Urban Planning*, 82 (3), pp. 145-158.

Kellert, S.R., Mehta, J.N., Ebbin, S.A. & Lichtenfeld, L.L., 2000. Community Natural Resource Management : promise, rhetoric, and reality. *Society & Natural Resources*, 13 (8), pp. 705–715.

Klooster, D. & Masera, O., 2000. Community forest management in Mexico: Carbon mitigation and biodiversity conservation through rural development. *Global Environmental Change*, 10, pp. 259–272.

Klooster, D., 2003. Campesinos and Mexican forest policy during the twentieth century. *Latin American Research Review*, 38 (2), pp. 94-126.

- Kosoy, N. & Corbera, E., 2010. Payments for ecosystem services as commodity fetishism. *Ecological Economics*, 69 (6), pp. 1228-1236.
- Krantz, L., 2001. The sustainable livelihood approach to poverty reduction. Stockholm: SIDA. Division for Policy and Socio-Economic Analysis.
- Lambin, E.F., Turner, B.L., Geist, H.J., Agbola, S.B., Angelsen, A., Bruce, J.W., Coomes, O.T., Dirzo, R., Fischer, G., Folke, C. and George, P., 2001. The causes of land-use and land-cover change: moving beyond the myths. *Global Environmental Change*, 11 (4), pp.261–269.
- Lambin, E.F., Geist, H.J. and Lepers, E., 2003. Dynamics of land-use and land-cover change in tropical regions. *Annual Review of Environment and Resources*, 28 (1), pp. 205-241.
- Lando, F., 1996. Fact and fiction: Geography and literature. *GeoJournal*, 38 (1), pp. 3–18.
- Lefebvre, H., 1974. La producción del espacio. *Papers: Revista de Sociología*, 3, pp. 219-229.
- Lévy, J., 2011. Territory: Part II. In: J. A. Agnew & J. S. Duncan, eds. *Human Geography*. West Sussex: Blackwell Publishing, pp. 271–282.
- Mackinson, S. and Nottestad, L., 1998. Points of view: combining local and scientific knowledge. *Reviews in Fish Biology and Fisheries*, 8 (4), pp. 481-490.
- Martínez Elorriaga, E., “Controlan al 95% incendio forestal en Uruapan”, *La Jornada*, 29 April [Online], Available at: <http://www.jornada.unam.mx/ultimas/2016/04/29/controlan-al-95-incendio-forestal-en-uruapan>
- Mas, J.F., Velázquez, A., Díaz-Gallegos, J.R., Mayorga-Saucedo, R., Alcántara, C., Bocco, G., Castro, R., Fernández, T. and Pérez-Vega, A., 2004. Assessing land use/cover changes: a nationwide multidecade spatial database for Mexico. *International Journal of Applied Earth Observation and Geoinformation*, 5 (4), pp. 249–261.
- Mas, J.-F., Velázquez, A. & Couturier, S., 2009. La evaluación de los cambios de cobertura/uso del suelo en la República Mexicana. *Investigación Ambiental Ciencia y Política Pública*, 1(1).
- Massey, D., 1991. A Global Sense of Place. *Marxism Today*, June, pp. 24–29.
- Massey, D., 1993. Power geometry and a progressive sense of place. In: J. Bird et al., eds. *Mapping the Futures: Local Cultures, Global Change*. London: Routledge, pp. 56–69.
- Matthews, R. & Selman, P., 2006. Landscape as a focus for integrating human and environmental processes. *Journal of Agricultural Economics*, 57 (2), pp. 199-212.
- McCall, M. K., 2003. Seeking good governance in participatory-GIS: a review of processes and governance dimensions in applying GIS to participatory spatial planning. *Habitat International*, 27, pp. 549-573.

- McCall, M. K., 2004. Can participatory-GIS strengthen local-level spatial planning? Suggestions for better practice. In *7th International Conference on GIS for Developing Countries (GISDECO 2004)*.
- McCall, M. K. & Minang, P.A., 2005. Assessing participatory GIS for community-based natural resource management: Claiming community forests in Cameroon. *Geographical Journal*, 171 (4), pp. 340–356.
- McCall, M., 2006. Precision for whom? Mapping ambiguity and certainty in (Participatory) GIS. *Participatory Learning and Action*, 54, pp.114–119.
- McCall, M.K., 2014. Mapping territories, land resources and rights: communities deploying participatory mapping/PGIS in Latin America. *Revista do Departamento de Geografia - USP*, Volume Especial Cartogeo, pp.94–122.
- McCall, M. K., 2015. PGIS for LSK. Applying PGIS and Participatory Mapping to Participatory Understanding and Management of (Rural) Space, utilizing Local Spatial Knowledge. A Bibliography. Available at: <http://www.ppgis.net/wp-content/uploads/2015/06/McCall-2015-Resgate-PGIS-for-LSK-RURAL-NRM-biblio-June.pdf>
- McCall, M. K., 2016. Beyond “Landscape” in REDD+: The Imperative for “Territory.” *World Development*, 85, pp.58–72.
- McCusker, B. and Carr, E.R., 2006. The co-production of livelihoods and land use change: Case studies from South Africa and Ghana. *Geoforum*, 37 (5), pp. 790-804.
- Meinig, D.W., 1979. The beholding eye: Ten versions of the same scene. In: *The Interpretation of Ordinary Landscapes: Geographical Essays*. pp. 33–50.
- Mitchell, D., 2000. Landscape as expectation: aesthetics, power, and the good life. In: *Cultural Geography: A Critical Introduction*. Malden: Blackwell Publishing, pp. 129-135.
- Müller, D. and Wode, B., 2002. Manual on participatory village mapping using photomaps. *Song Da, Vietnam: Soc. For. Dev. Proj. GTZ/GFA*.
- Nassauer, J.I., 2012. Landscape as medium and method for synthesis in urban ecological design. *Landscape and Urban Planning*, 106 (3), pp. 221-229.
- Nogué, J., 2006a. La producción social y cultural del paisaje. In: *El Paisaje y la Gestión del Territorio: Criterios Paisajísticos en la Ordenación del Territorio y el Urbanismo* (pp. 135-142). Diputación Provincial de Barcelona.
- Nogué, J., 2006b. Geografía política. In: *Tratado de Geografía Humana*. D.F.: Anthropos Editorial.
- Nogué, J., 2014. Sentido de lugar, paisaje y conflicto. *Geopolítica(s)*, 5 (2), pp. 155–163.

- Oettingen, G. & Mayer, D., 2002. The motivating function of thinking about the future: expectations versus fantasies. *Journal of Personality and Social Psychology*, 83( 5), pp. 1198–1212.
- Olwig, K.J., 2008. Performing on the Landscape, versus Doing Landscape: Perambulatory Practice, Sight and the Sense of Belonging. In T. Ingold & J. L. Vergunst, eds. *Ways of Walking: Ethnography and Practice on Foot*. London: Routledge, pp. 81–91.
- Olwig, K.R., 2009. Landscape, Culture and Regional Studies: Connecting the Dots. In: *A Companion to Environmental Geography*. pp. 238–252.
- Orozco Ramírez, Q., Astier, M. & Barrasa, S., 2017. Agricultural Land Use Change after NAFTA in Central West Mexico. *Land*, 6 (66), pp. 1–14.
- Pattison, W.D., 1964. The four traditions of geography. *Journal of Geography*, 63 (5), pp. 211–216.
- Pearce, M. and Louis, R., 2008. Mapping indigenous depth of place. *American Indian Culture and Research Journal*, 32 (3), pp. 107-126.
- Pretty, J.N., 1995. Participatory learning for sustainable agriculture. *World Development*, 23 (8), pp. 1247-1263.
- Pretzsch, J., 2005. Forest related rural livelihood strategies in national and global development. *Forests, Trees and Livelihoods*, 15 (2), pp. 115–127.
- Procuraduría Agraria., n.d. PROCEDE [Online]. Available at: <http://www.pa.gob.mx/publica/pa070113.htm> (Accessed 13 July 2016).
- Rambaldi, G., Kyem, P.A.K., McCall, M. and Weiner, D., 2006. Participatory spatial information management and communication in developing countries. *The Electronic Journal of Information Systems in Developing Countries*, 25 (1), pp. 1-9.
- Raymond, C.M., Bryan, B.A., MacDonald, D.H., Cast, A., Strathearn, S., Grandgirard, A. and Kalivas, T., 2009. Mapping community values for natural capital and ecosystem services. *Ecological Economics*, 68 (5), pp. 1301-1315.
- Relph, E., 1997. Sense of place. In: S. Hanson, ed. *Ten Geographic Ideas that Changed the World*. Rutgers University Press, pp. 205–226.
- Rocheleau, D. & Edmunds, D., 1997. Women, men and trees: Gender, power and property in forest and agrarian landscapes. *World Development*, 25 (8), pp.1351–1371.
- Rose, G., 2003. On the need to ask how, exactly, is geography “visual”? *Antipode*, 35 (2), pp. 212-221.
- Rubio, B., 2006. Territorio y globalización en México: ¿un nuevo paradigma rural? *Comercio Exterior*, 56 (12), pp. 1047–1054.
- Sánchez-Luna, G., 1995. Algunas notas en relación con la tenencia de la tierra en México. *Boletín Mexicano de Derecho Comparado*, 84, pp. 1139-1154.

- Santos, M., 1990. *Por Una Geografía Nueva*, Madrid: Espasa-Calpe.
- Santos, M., 1996. *Metamorfosis del Espacio Habitado*, Barcelona: oikos-tau.
- Sauer, C.O., 1925. The Morphology of Landscape. *University of California Publications in Geography*, 2 (2), pp. 19-53.
- Scarce, D. and Fulton, K., 2004. *What If?: The Art of Scenario Thinking for Nonprofits*. Emeryville: Global Business Network.
- Schwedes, S. & Werner, W., 2010. Manual for participatory land use planning facilitators, *Ministry of Lands and Settlement and German Technical Cooperation (GTZ)*, pp. 139-141.
- Scoones, I., 1998. Sustainable rural livelihoods: a framework for analysis. *Institute of Development Studies*, Working Paper (72), pp. 3-22.
- Selman, P., 2004. Community participation in the planning and management of cultural landscapes. *Journal of Environmental Planning and Management*, 47 (3), pp. 365–392.
- SID, 2004. Tutafika: Imagining Our Future-Tanzania [online]. Available at: <http://www.scenarios.ws/tutafika/default.htm> (Accessed 29 March, 2015).
- Sunderland, T., Achdiawan, R., Angelsen, A., Babigumira, R., Ickowitz, A., Paumgarten, F., Reyes-García, V. and Shively, G., 2014. Challenging perceptions about men, women, and forest product use: a global comparative study. *World Development*, 64, pp. S56-S66.
- Tan-Kim-Yong, U., 1992. Participatory land-use planning for natural resource management in northern Thailand. *Network Paper-Rural Development Forestry Network (United Kingdom)*.
- Tejera Hernández, B., Santos, A., Santamaría, H., Gómez, T. and Olivares, C., 2013. El oro verde en Michoacán: ¿un crecimiento sin fronteras? Acercamiento a la problemática y retos del sector aguacatero para el Estado y la sociedad. *Economía y Sociedad*, 17 (29), pp. 15-40.
- Thiébaud, V., 2010. Evolución del paisaje aguacatero en Michoacán: Procesos socioeconómicos y medioambientales. *Revista Estudios Sociales Nueva Época*, IV (7), pp.235–254.
- Thompson, C.W., 2012. Landscape perception and environmental psychology. In: *The Routledge Companion to Landscape Studies*. pp. 25–42.
- Tichelaar, T., 2002. Toponymy and language. *DGSD-UNGEGN Toponymy Course Enschede/Frankfurt am Main August*, pp.12-23.
- Torres, Y., 2017. “Aguacates ya dejan más dinero a México que los hidrocarburos”, *El Financiero*, 6 March [Online]. Available at: <http://www.elfinanciero.com.mx/economia/aguacates-ya-dejan-mas-que-los-hidrocarburos.html> (Accessed: 12 March, 2017).



- Torres Mazuera, G., 2012. El ejido posrevolucionario: de forma de tenencia sui generis a forma de tenencia ad hoc. *Península*, VII (2), pp. 69–94.
- Tress, B. & Tress, G., 2003. Scenario visualisation for participatory landscape planning-a study from Denmark. *Landscape and Urban Planning*, 64 (3), pp. 161–178.
- Tuan, Y.F., 1975. Place: an experiential perspective. *Geographical Review*, 65 (2), pp.151-165.
- Tuan, Y.F., 1976. Humanistic geography. *Annals of the Association of American Geographers*, 66 (2), pp. 266-276.
- Tuan, Y.F., 1979. Thought and landscape: the eye and the mind's eye. In: *The Interpretation of Ordinary Landscapes*, pp. 89-102.
- Tuan, Y.F., 1980. Rootedness versus sense of place. *Landscape*, 24, pp. 3–8.
- Tuan, Y.F., 1989. Surface phenomena and aesthetic experience. *Annals of the Association of American Geographers*, 79 (2), pp. 233-241.
- Tuan, Y.F., 1990. *Topophilia: A Study of Environmental Perception, Attitudes, and Values*, New York: Columbia University Press.
- Tuan, Y.F., 2013. *Landscapes of Fear*, Minneapolis: University of Minnesota Press.
- Tuan, Y.F., 2014. *Space and Place: The Perspective of Experience.*, Minneapolis: University of Minnesota Press.
- Vázquez, J.L.P., 2013. Mercado de tierras y propiedad social: una discusión actual. *Anales de Antropología*, 47 (2), pp. 9-38.
- Villamor, G.B., Desrianti, F., Akiefnawati, R., Amaruzaman, S. and van Noordwijk, M., 2014. Gender influences decisions to change land use practices in the tropical forest margins of Jambi, Indonesia. *Mitigation and Adaptation Strategies for Global Change*, 19 (6), pp. 733-755.
- Wollenberg, E., Edmunds, D. and Buck, L., 2000. Using scenarios to make decisions about the future: anticipatory learning for the adaptive co-management of community forests. *Landscape and Urban Planning*, 47 (1-2), pp. 65-77.
- Wood, D., 1992. How maps work. *Cartographica: The International Journal for Geographic Information and Geovisualization*, 29 (3-4), pp. 66-74.
- Yamagishi, T., 1992. Landscape and the human being. *Human Studies*, 15 (1), pp.95-115.
- Zube, E.H., Sell, J.L. and Taylor, J.G., 1982. Landscape perception: research, application and theory. *Landscape Planning*, 9 (1), pp. 1-33.
- Zube, E.H. & Sell, J.L., 1986. Human Dimensions of Environmental Change. *Journal of Planning Literature*, 1 (2), pp. 162–176.

Zube, E.H., 1987. Perceived land use patterns and landscape values. *Landscape Ecology*, 1 (1), pp. 37–45.

Zúñiga Alegría, J.G. & Castillo López, J.A., 2010. La Revolución de 1910 y el mito del ejido mexicano. *Alegatos*, (75), pp. 497–522.

Annex 1.

**GUIÓN PARA TALLER DE MAPEO PARTICIPATIVO**  
—Expectativas locales de uso del suelo—

El objetivo de este taller es conocer y ubicar en el espacio los usos que le dan a su tierra; las diferentes opiniones que puede haber entre, por ejemplo, hombres y mujeres, jóvenes y adultos, con la mesa directiva, etc; y, finalmente, hacia dónde van dichos usos a futuro (10 años), es decir, ¿CÓMO CREEN QUE SERÁ SU EJIDO? ¿Qué cambios creen que puedan suceder? ¿CÓMO LES GUSTARÍA QUE SEA? ¿Qué cambios harían para mejorarlo? Y, ¿CÓMO NO LES GUSTARÍA QUE SEA? ¿Qué sería lo peor que le podría pasar a su tierra? OJO: recuerden que todo es de aquí a 10 años. La idea de hacerlo en grupos es que dialoguen entre ustedes y expresen sus opiniones. Al final de la sesión tendremos cinco mapas que podremos sobreponer para ver las diferencias.

\*Los nombres se tomarán sólo como una medida de organización para los datos. NO aparecerán en ningún documento generado a partir de este trabajo.

**1. DATOS GENERALES (1-7 min)**

| <b>NOMBRE</b> | <b>EDAD</b> | <b>PRINCIPAL ACTIVIDAD PRODUCTIVA</b> |
|---------------|-------------|---------------------------------------|
|               |             |                                       |
|               |             |                                       |
|               |             |                                       |
|               |             |                                       |
|               |             |                                       |

\*Antes de iniciar vale la pena hacer un reconocimiento breve de la imagen: ubicar espacios como el pueblo, carreteras importantes, huertas, etc. Asimismo, ejemplificar coberturas como: bosque, cultivos, cuerpos de agua, etc.

## 2. MAPA CLASIFICACIÓN Y USO DEL SUELO ACTUAL (10-20 min)

La primera actividad consiste en dibujar áreas según los diferentes usos ACTUALES (agrícola, pastoreo, forestal maderable, forestal no maderable, recreación, etc.). Nosotros trazaremos uno de ejemplo para que se den una idea de cómo es (*señalar con un asterisco o marca el polígono trazado por el mediador*). Si quieren, pueden ayudarse de los patrones visuales (colores, texturas) para designar las áreas; pero la actividad es LIBRE. Queremos conocer cómo usan SU espacio.

*El mapa resultante será un mosaico de polígonos caracterizados por diferentes usos ACTUALES.*

| Polígono (N°) | Uso/Actividades/Cobertura |
|---------------|---------------------------|
| 1             |                           |
| 2             |                           |
| 3             |                           |
| 4             |                           |
| 5             |                           |
| 6             |                           |
| 7             |                           |

### 3. MAPA DE USOS DEL SUELO PASADOS, 10 AÑOS ATRÁS (10-15 min)

Ahora vamos a trabajar con los usos que le daban a su territorio hace 10 años. ¿Ha habido cambios? Dibujen qué ha cambiado. ¿Qué había antes? ¿Por qué se han dado esos cambios? Pueden dibujar nuevas áreas o cambiar el tamaño de las anteriores si así lo desean.

*Se recomienda motivar el diálogo con la pregunta ¿POR QUÉ?*

*El mapa resultante será un nuevo mosaico caracterizado por diferentes usos PASADOS, de hace 10 años aproximadamente.*

| Polígono (N°) | Uso/Actividades/Cobertura |
|---------------|---------------------------|
| 1             |                           |
| 2             |                           |
| 3             |                           |
| 4             |                           |
| 5             |                           |
| 6             |                           |
| 7             |                           |

#### 4. MAPA DE EXPECTATIVAS “REALISTAS” A FUTURO (10-15 min)

Ya que se han dado una idea de cómo ha cambiado el ejido en los últimos 10 años según lo que recuerdan, lo que sigue es pensar a futuro, 10 años aprox. ¿Qué creen que va a cambiar y dónde? ¿Por qué creen que van a darse esos cambios? Por ejemplo, ¿creen que habrá más huertas de aguacate, o más bosque por reforestación, o más pastoreo? ¿Qué permanece y qué cambia? Traten de ser lo más REALISTAS posible. ¿El resultado les parece satisfactorio?

*El mapa resultante será un nuevo mosaico caracterizado por diferentes usos FUTUROS REALISTAS, 10 años aproximadamente.*

| Polígono (N°) | Uso/Actividades/Cobertura |
|---------------|---------------------------|
| 1             |                           |
| 2             |                           |
| 3             |                           |
| 4             |                           |
| 5             |                           |
| 6             |                           |
| 7             |                           |

### 5. MAPA DE EXPECTATIVAS “IDEALES” A FUTURO (10-15 min)

Bien, ya pensaron cómo va a ser su ejido a futuro. Lo siguiente es dibujar cómo les gustaría que sea. Pueden guiarse pensando en qué áreas son las que más les gustan del ejido y para qué las utilizan o qué usos son los que les parecen más importantes. Quizá también les gustaría dar un uso distinto a los que tienen, algo nuevo, u otros que permanezcan sin cambio. ¿Por qué les gustaría que sea de esta forma? ¿Qué creen que pueden hacer para llegar a este escenario?

*El mapa resultante será un nuevo mosaico caracterizado por diferentes usos FUTUROS IDEALISTAS, 10 años aproximadamente.*

| Polígono (N°) | Uso/Actividades/Cobertura |
|---------------|---------------------------|
| 1             |                           |
| 2             |                           |
| 3             |                           |
| 4             |                           |
| 5             |                           |
| 6             |                           |
| 7             |                           |

## 6. MAPA DE VISIONES “NEGATIVAS” A FUTURO (10-15min)

*Simultáneamente, en el mismo acetato, con otro color u otra numeración, marcar:*

El siguiente mapa es el contrario al que acaban de hacer. Teniendo en cuenta “cómo creen que va a ser”, “cómo les gustaría que fuera” y la escala temporal de 10 años; ¿cómo NO les gustaría que sea su ejido? Para esto pueden guiarse pensando en qué áreas son las que menos les gustan o qué usos son los que menos les benefician. ¿Por qué NO les gustaría que sea de esta forma? ¿Qué pueden hacer para evitar caer en esto?

*El mapa resultante será un nuevo mosaico caracterizado por diferentes usos FUTUROS NEGATIVOS, 10 años aproximadamente.*

| Polígono (N°) | Uso/Actividades/Cobertura |
|---------------|---------------------------|
| 1             |                           |
| 2             |                           |
| 3             |                           |
| 4             |                           |
| 5             |                           |
| 6             |                           |
| 7             |                           |



NOTAS:

Algunos tendrán curiosidad de saber ¿PARA QUÉ? hacemos este ejercicio. Creemos que trabajos como este pueden motivar el diálogo interno para conseguir una planeación del territorio que guste a la mayoría y servir de guía para organizar el uso de su espacio según sus necesidades y deseos. También puede servir como referencia en caso de que alguna institución o agente externo quisiera incidir en su terreno, con esto tendrán una base de lo que tienen, lo que quieren y lo que NO quieren. Finalmente, sirve como un ejemplo para promover que otras universidades o instituciones tomen en cuenta las opiniones que hay en los lugares y no se basen únicamente en los estudios hechos desde fuera, pues nadie conoce mejor un lugar que quien lo habita.

*Finalmente, si así lo desean, se pueden sobreponer las capas para ver las diferencias entre mapas.*

¡MUCHAS GRACIAS POR PARTICIPAR!

Annex 2.

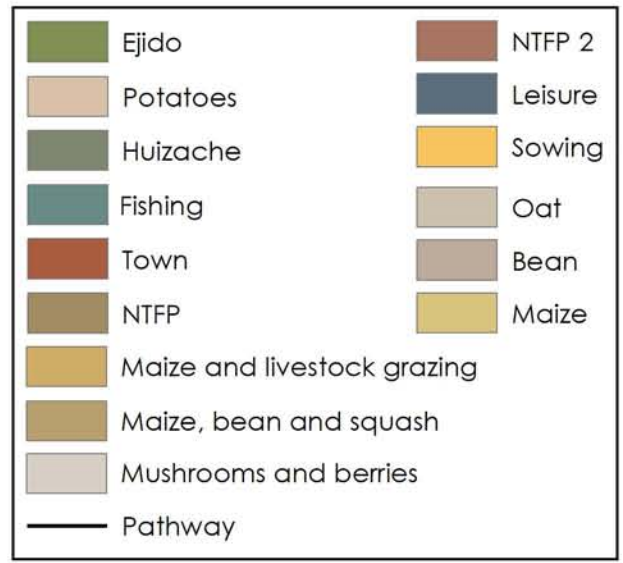
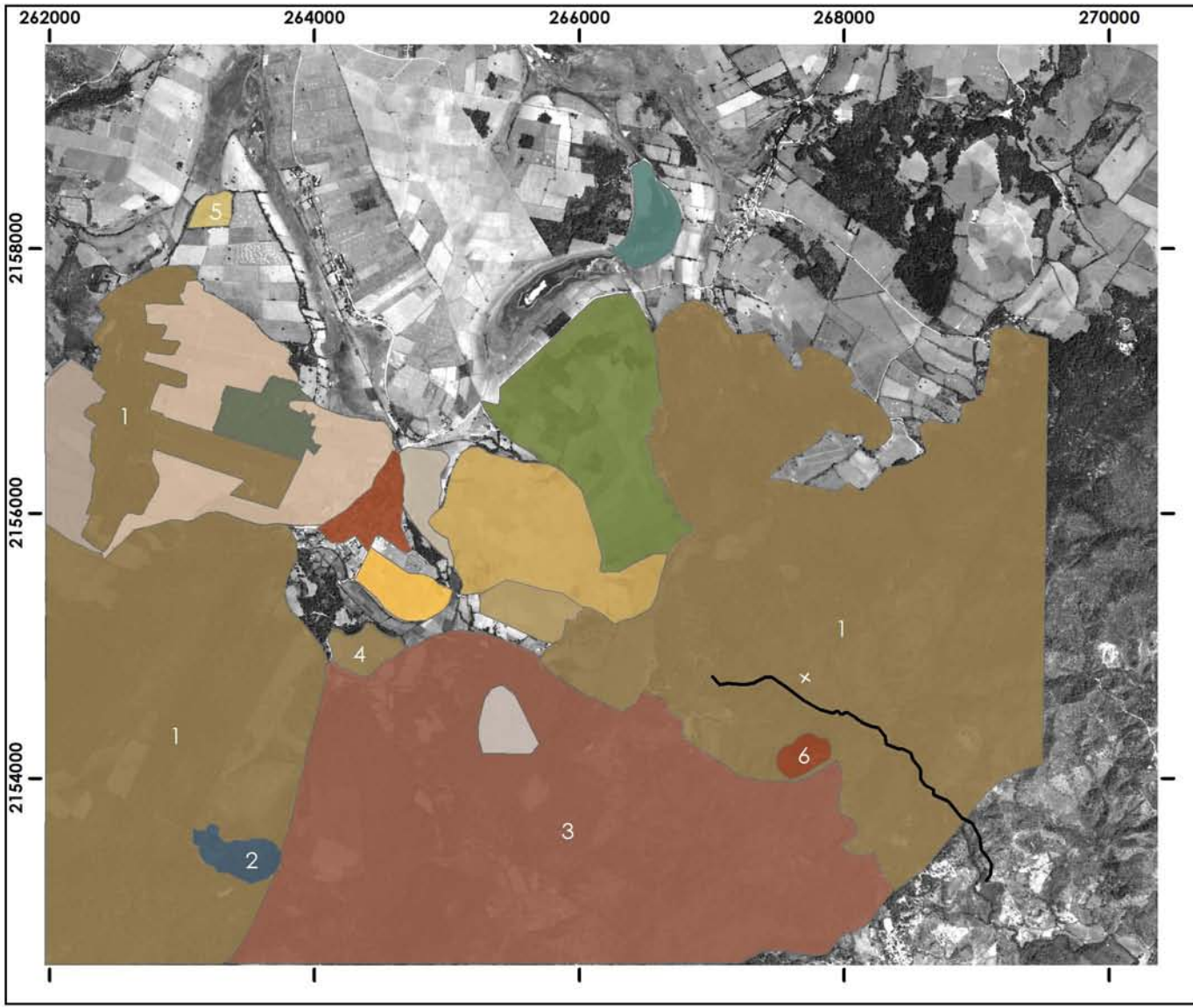
- Steps for building future land use expectations. In black, main questions asked at the workshops; in red, questions we recommend to improve results.

| LAND USE SCENARIOS FOR BUILDING LOCAL SPATIAL FUTURE EXPECTATIONS   |   |   |  |
|---|---|---|--|
| STEP 1  | STEP 2  | STEP 3  | STEP 4   |
| Mapping present LU  | Mapping past LU   | Mapping future LU (realistic)   | Mapping future LU (ideal/horror)   |
| <ul style="list-style-type: none"> <li>Who are you?</li> <li>Where are we?</li> <li>Where do you go to work/ do your activities?</li> <li>What are de main economic activities in your community?</li> <li>Where are they developed?</li> <li></li> </ul> | <p>In the last 10 years (approx.),</p> <ul style="list-style-type: none"> <li>What has changed?</li> <li>You gain your living the same way?</li> <li>Where have those changes occurred?</li> <li>Do you go to the same places/ use the same land?</li> <li>What do you think of those changes (for better or worst)?</li> </ul> | <p>In 10 years from now,</p> <ul style="list-style-type: none"> <li>What do you think is going to change?</li> <li>How do you believe your territory will look like?</li> <li>Where do you think those changes will occur?</li> <li>Why are those changes going to happen?</li> <li>Will you continue to use your land the same way?</li> </ul> | <p>In 10 years from now,</p> <ul style="list-style-type: none"> <li>How would you like your territory/community to look like?</li> <li>What changes would be good/bad on the way you use your land?</li> <li>Where would you want changes to occur?</li> <li>Why those changes?</li> <li>What can you do to reach the ideal / avoid the unwanted?</li> </ul> |
| Printed Google Earth image<br>1 Plastic sheet<br>Markers<br>Voice recorder  | Printed Google Earth image<br>1 Plastic sheet<br>Markers<br>Voice recorder  | Printed Google Earth image<br>1 Plastic sheet<br>Markers<br>Voice recorder  | Printed Google Earth image<br>1 Plastic sheet<br>Markers<br>Voice recorder   |
| Time: 20 min.   | Time: 15 min.   | Time: 15min   | Time: Free   |

M A P S

N I E V E S

# Past Land Uses Identified by Women from Nieves



Notes:

1. Forest: resin, berries, mushrooms ("trompas").
2. "La Peña".
3. Resin, berries, mushrooms, firewood, torch pine, potting soil, armadillos, squirrels and mourning doves.
4. Before it was forest.
5. It is now a cranberry orchard.
6. There used to be a river and houses.

+ They used to sell berries, potting soil and search for medicinal plants.

Spatial reference:

Projection: UTM  
 Datum: WGS 84  
 Zone: 14 N  
 25-09-2015

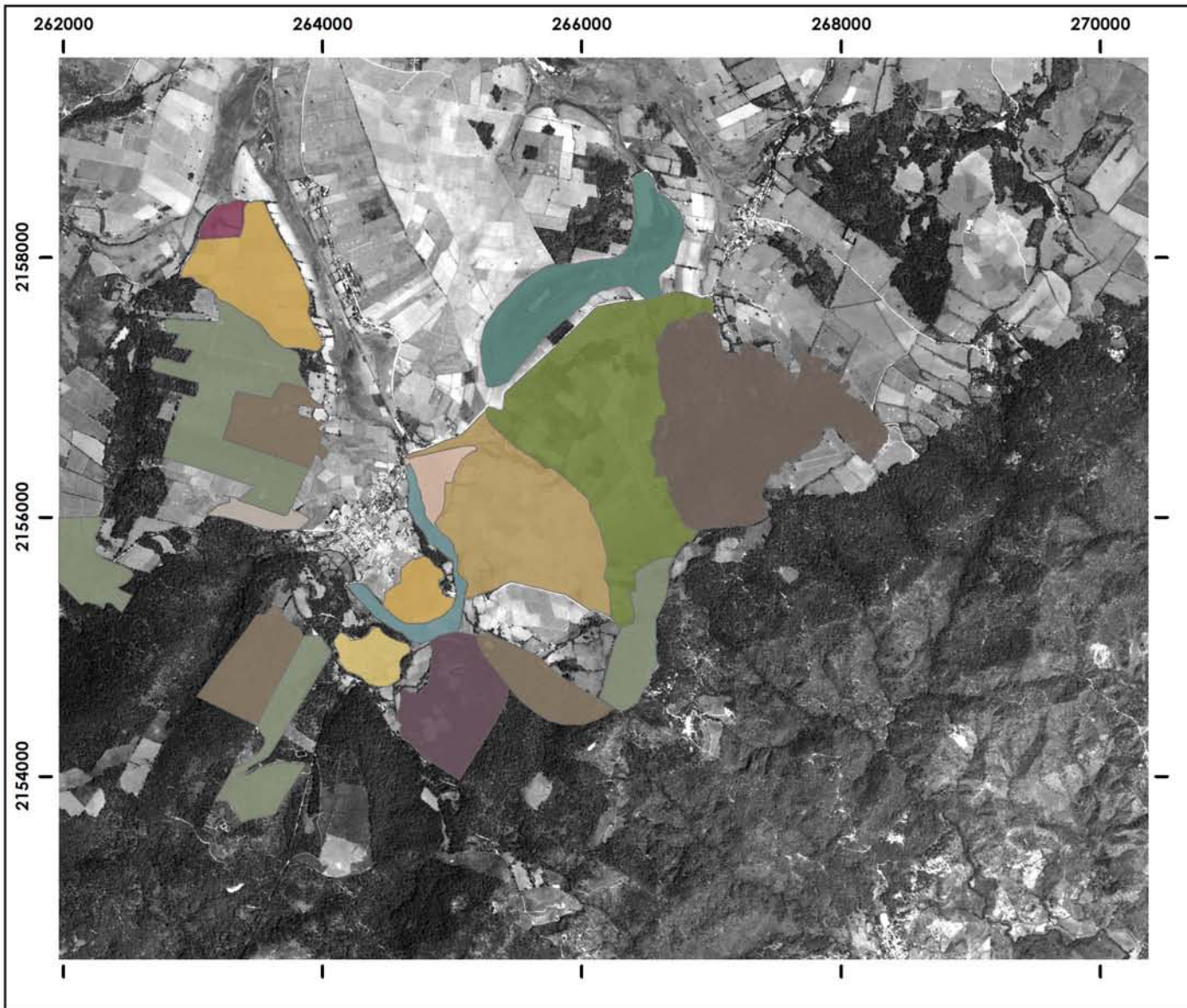
Author: Adrián Ortega Iturriaga  
 Participants: Women from Nieves.



1:50,000



# Present Land Uses Identified by Women from Nieves

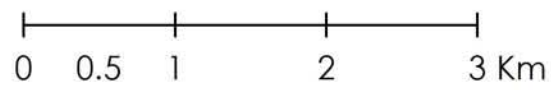


- Maize, bean, squash and barley
- Ejido
- Livestock hydratation
- Avocado orchard
- Blueberry orchard
- Firewood and resin
- Livestock grazing
- Fishing
- Mushrooms
- Resin and potting soil
- Sowing
- Sowing and grazing
- Berries and firewood

Spatial reference:

Projection: UTM  
 Datum: WGS 84  
 Zone: 14N  
 23-09-2015

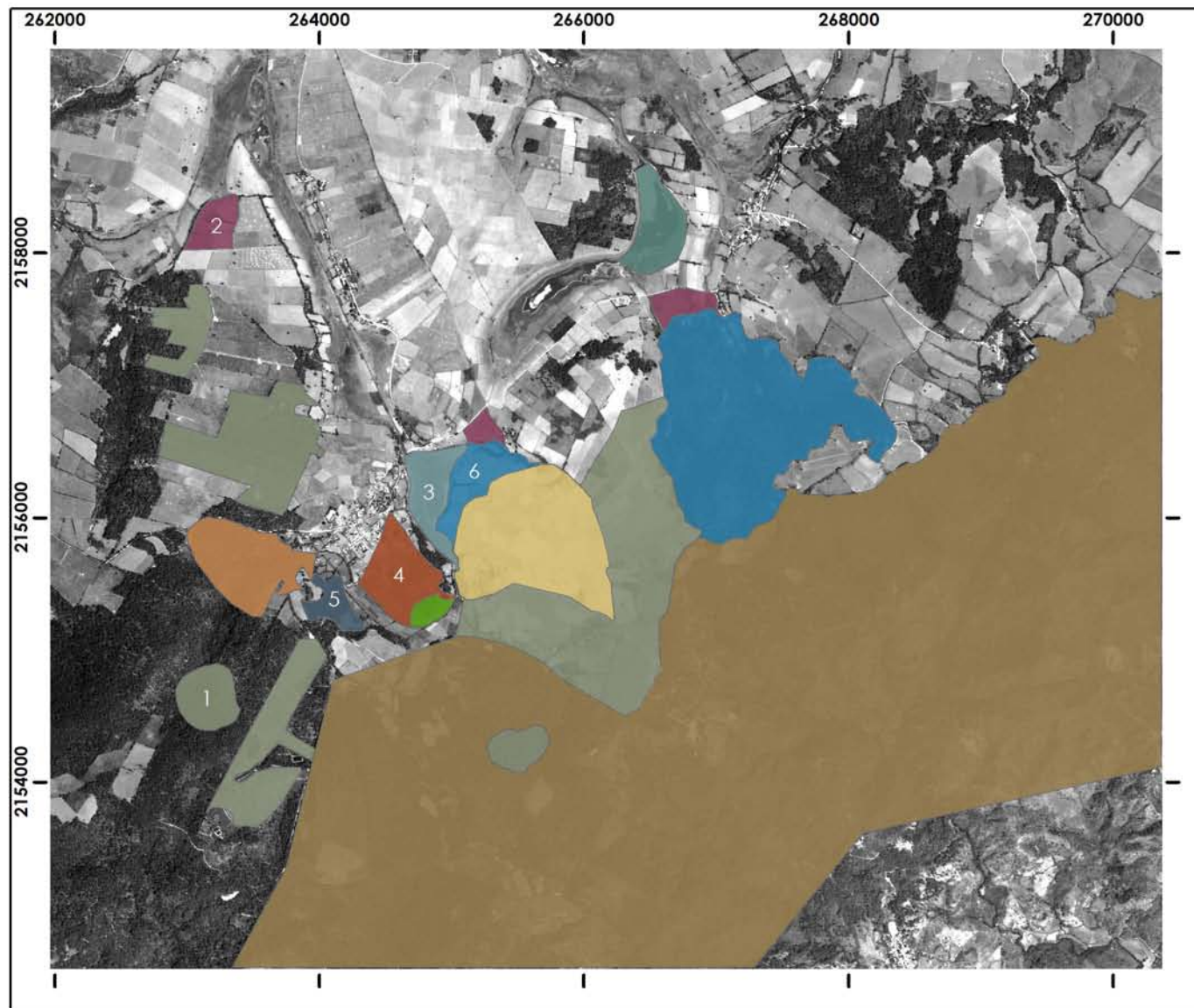
Author: Adrián Ortega Iturriaga  
 Participants: Women from Nieves.



1:50,000



# Future Land Use Expectations Identified by Women from Nieves



Notes:

1. The orchard will be extended.
2. Cranberry and blackberry.
3. It will continue as lagoon.
4. The town will grow.
5. Park.
6. Cabins.

Spatial reference:

Projection: UTM  
 Datum: WGS 84  
 Zone: 14N  
 09-10-2015

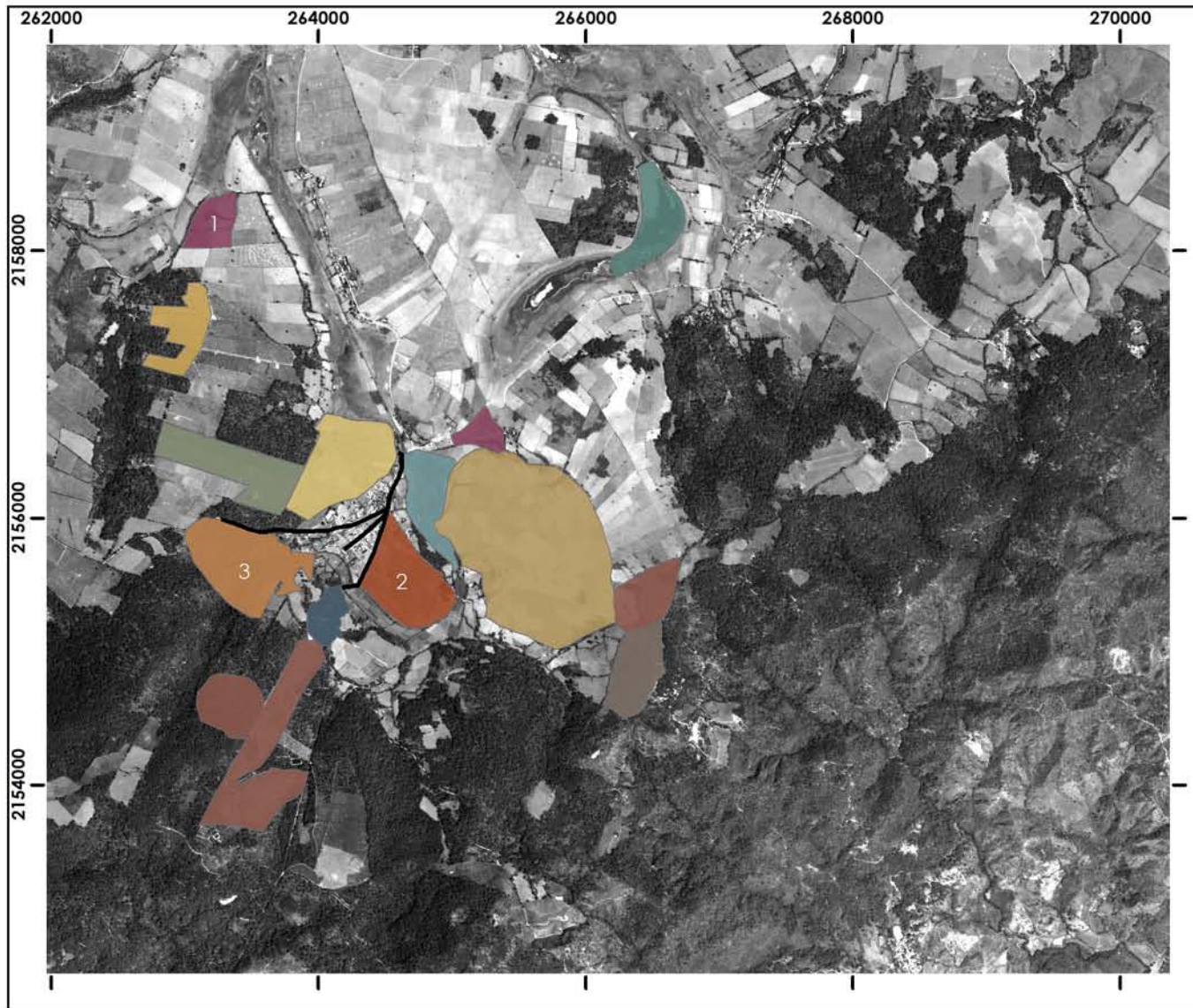
Author: Adrián Ortega Iturriaga  
 Participants: Women from Nieves.



1:50,000



# Desired Land Uses Identified by Women from Nieves



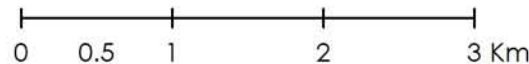
## Notes:

1. Blueberry and blackberry.
2. Bigger town.
3. Work.

## Spatial reference:

Proyection: UTM  
 Datum: WGS 84  
 Zone: 14N  
 14-10-2015

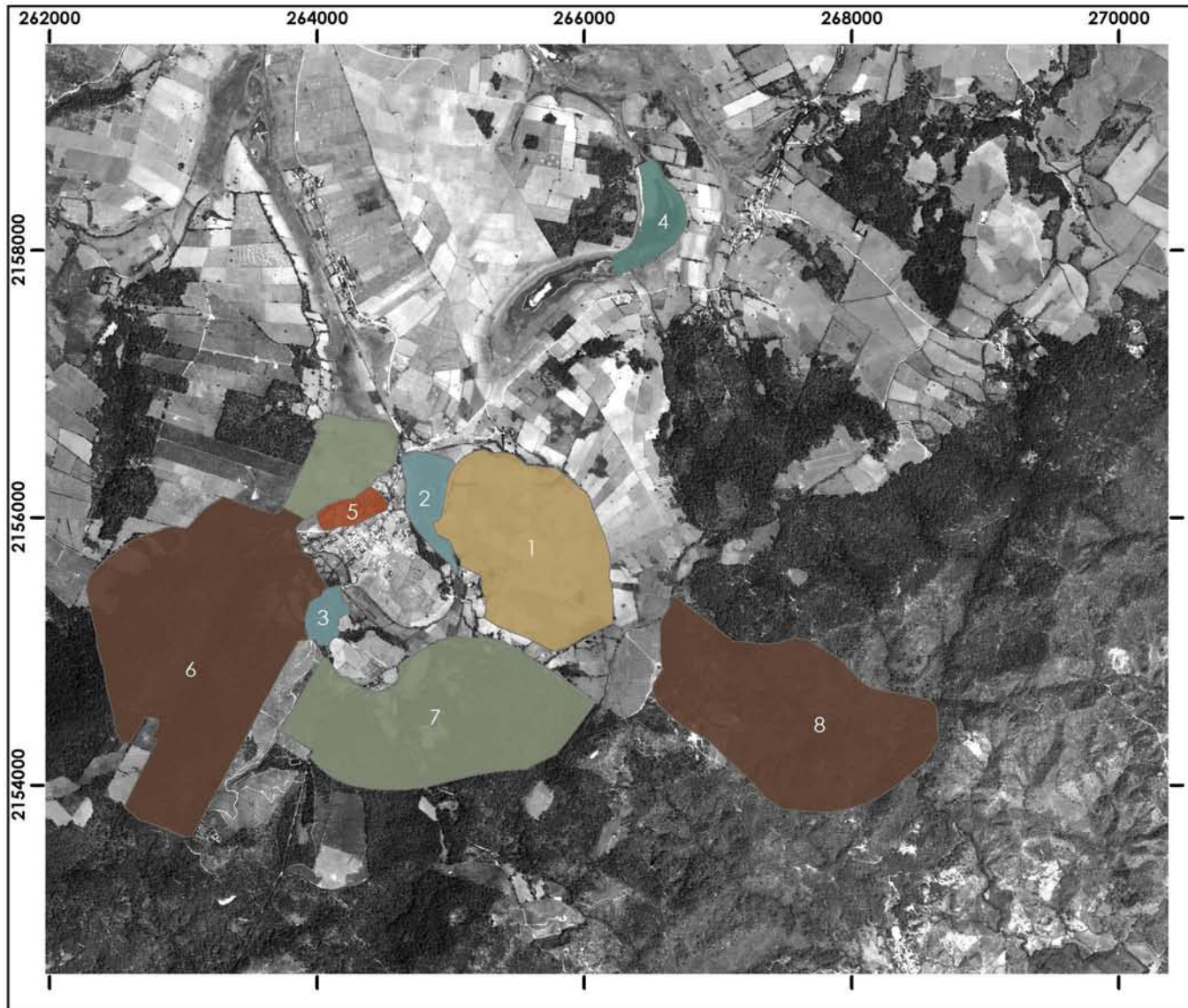
Author: Adrián Ortega Iturriaga  
 Participants: Women from Nieves.



1:50,000



# Feared Land Use Changes Identified by Women from Nieves

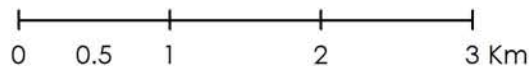


- Notes:
1. If crops are not good due to lack of water.
  2. If the lagoon definitely dried.
  3. If the springs dried.
  4. If fishing is no longer good.
  5. Less populated.
  6. If "monte" disappear.
  7. More orchards.
  8. Illegal logging.

Spatial reference

Proyection: UTM  
 Datum: WGS 84  
 Zone: 14N  
 14-10-2015

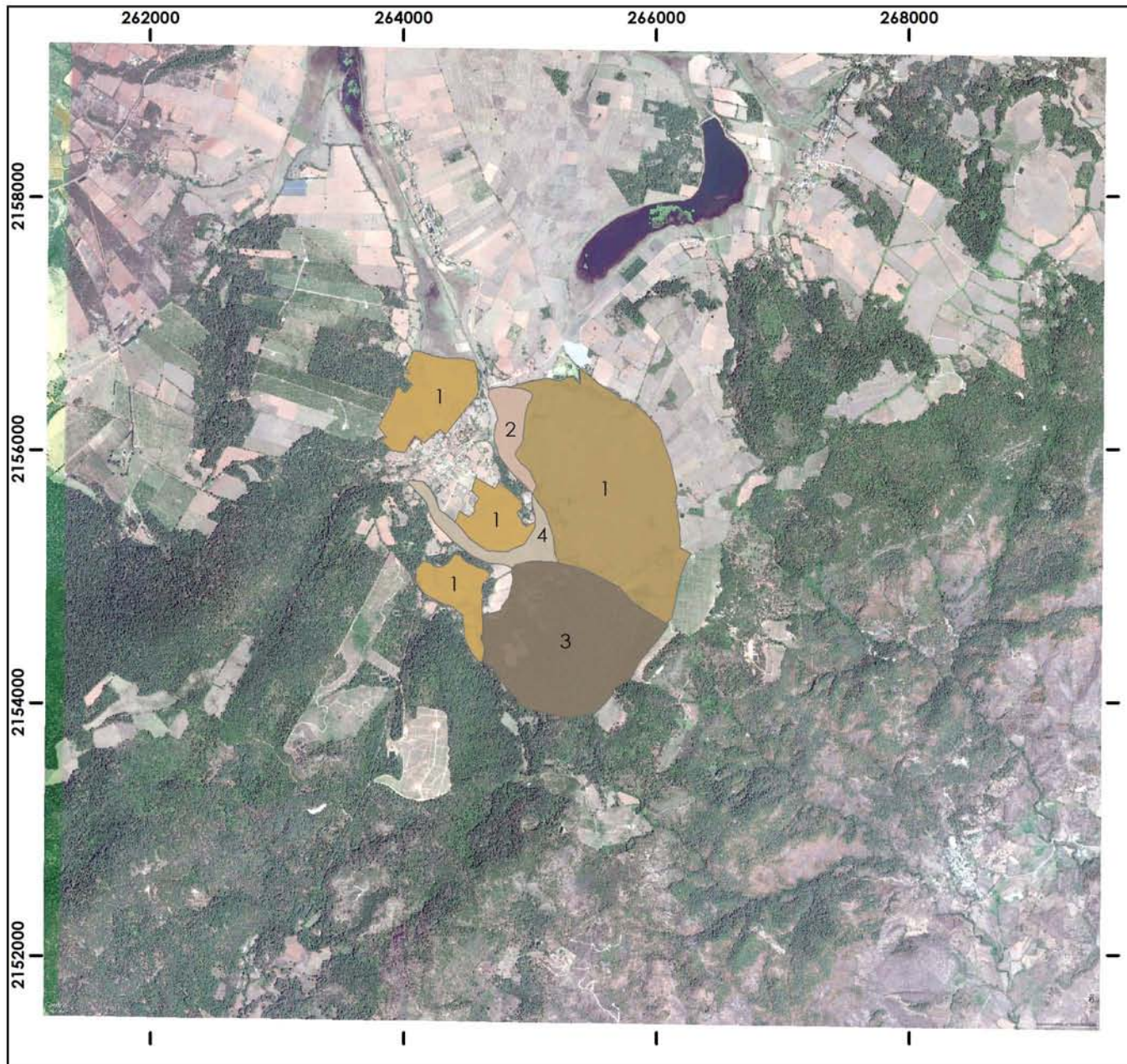
Author: Adrián Ortega Iturriaga  
 Women from Nieves participated in the crafting of this map.



1:50,000



# Present Land Uses Identified by Men from Nieves



Notes:

1. One year crops and the next livestock grazing.
2. "El Llano".
3. Resin and wood for selling and home consumption firewood.
4. "La Ciénega".

Spatial reference:

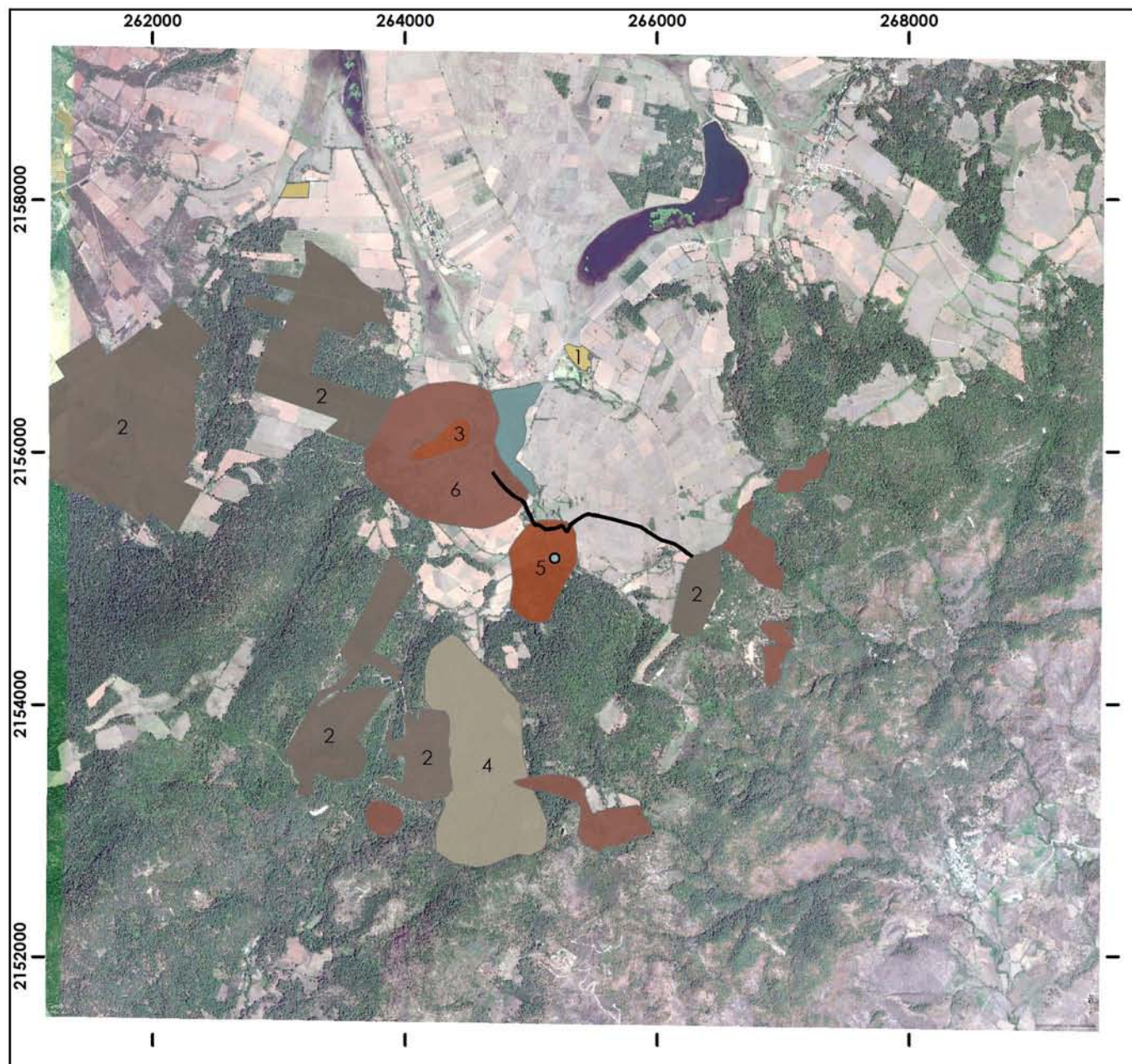
Proyection: UTM  
 Datum: WGS 84  
 Zone: 14 N  
 24-09-2015  
 Author: Adrián Ortega Iturriaga  
 Participants: Men from Nieves



1:50,000

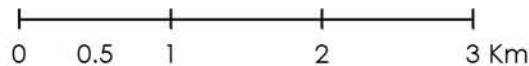


# Past Land Uses Identified by Youngsters from Nieves



- Notes:
1. Maize.
  2. Pines.
  3. Less houses.
  4. There were more animals.
  5. There were houses.
  6. There was no greenhouse.
  7. It was monte: mushrooms and firewood gathering.

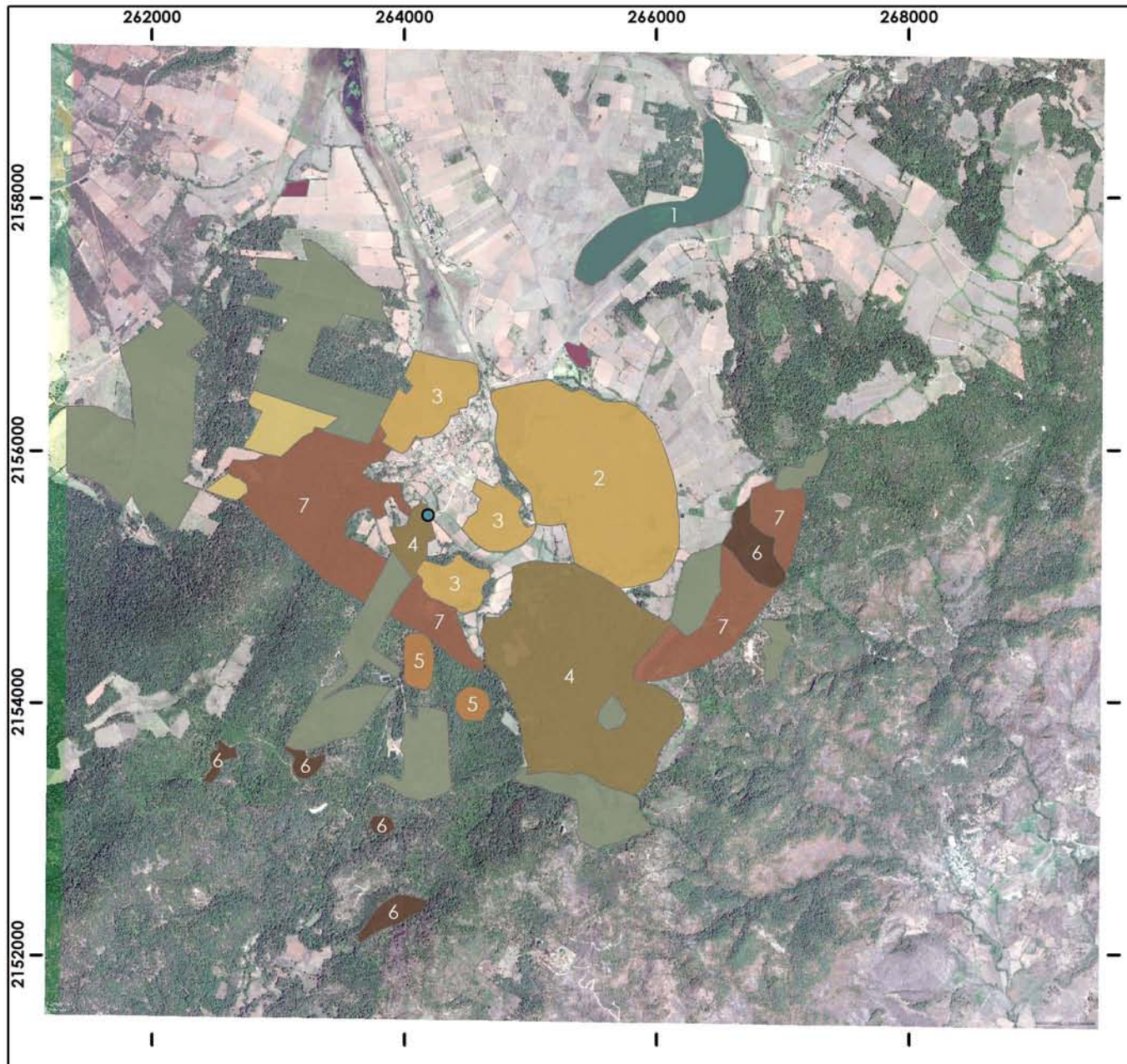
Spatial reference  
 Projection: UTM  
 Datum: WGS 84  
 Zone: 14N  
 14-10-2015  
 Author: Adrián Ortega Iturriaga  
 Highschool students from Nieves  
 participated in the crafting of this map.



1:50,000



# Present Land Uses Identified by Youngsters from Nieves



## Notes:

1. Fishing of mojarras.
  2. Maize, oat, grazing and 6 ha of pine reforestation.
  3. Maize, oat and grazing.
  4. Resin, timber, berries, mushrooms, wood and lemon grass.
  5. Chilies under the canopy.
  6. Pine logging.
  7. Resin, mushrooms and potting soil.
- "El Chorrito"

## Spatial reference:

Proyection: UTM  
 Datum: WGS 84  
 Zone: 14N  
 23-09-2015

Author: Adrián Ortega Iturriaga  
 Participants: Highschool students from Nieves.

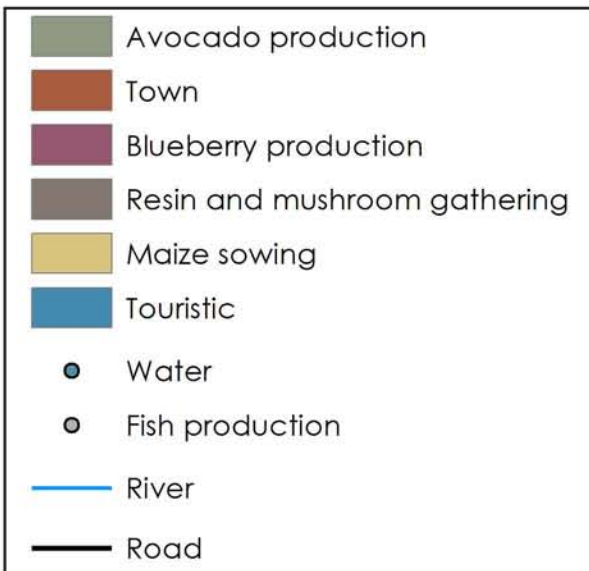
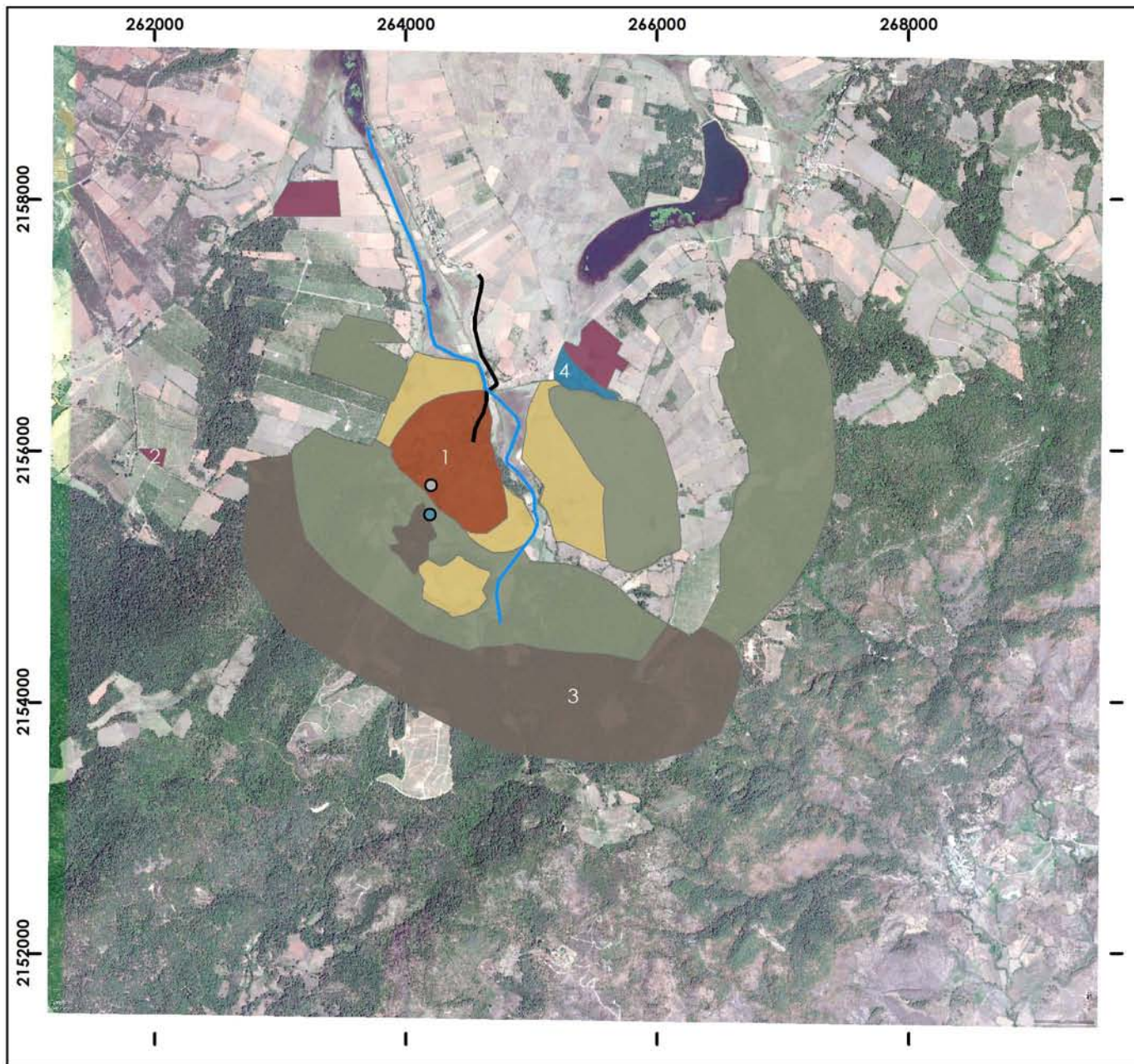


0 0.5 1 2 3 Km

1:50,000



# Future Land Use Expectations Identified by Youngsters from Nieves



## Notes

1. More houses. Town will grow.
2. They are going to build another greenhouse.
3. People will have to go further to get NTFP.
4. Touristic centre.

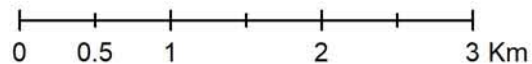
## Spatial reference

Projection: UTM  
 DATUM: WGS 84  
 Zone: 14N  
 05-11-2015

Author: Adrián Ortega Iturriaga  
 Participants: Highschool students from Nieves

## Geographic reference

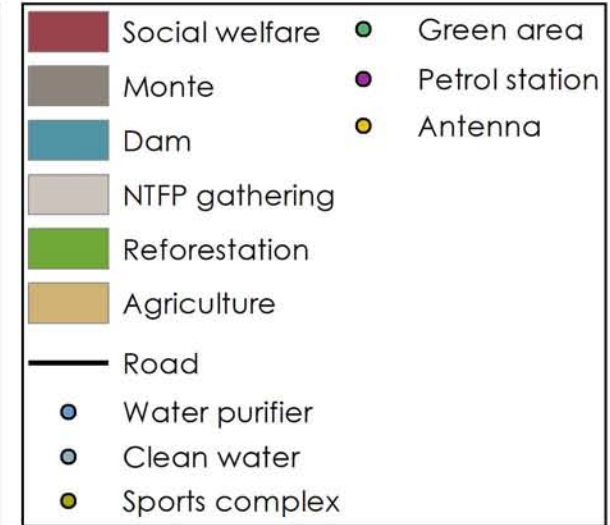
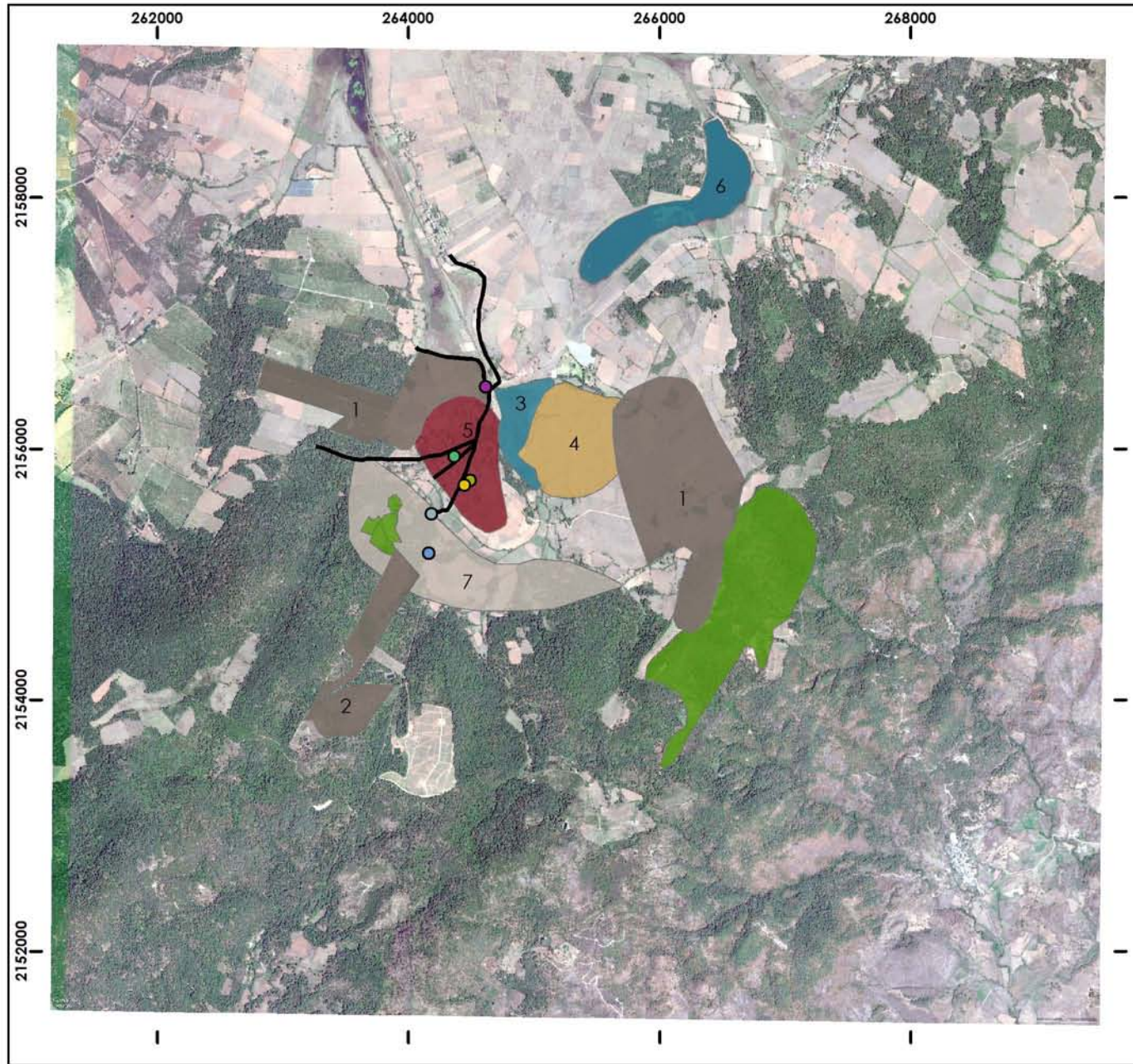
Google Earth Pro  
 Image 2015 DigitalGlobe



1:50,000



# Ideal Expectations Identified by Youngsters from Nieves



## Notes

1. Pines, more trees, more animals.
2. Pines, more trees, more animals.  
Reduce orchards from outsiders.
3. Rehabilitate the dam to have water.
4. Diversify maize cultivation.
5. Bigger town. Antenna.
6. That it grows.
7. Gather mushrooms and firewood closer.

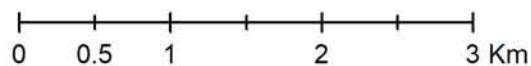
## Spatial reference

Projection: UTM  
 DATUM: WGS 84  
 Zone: 14N  
 11-11-2015

Author: Adrián Ortega Iturriaga  
 Participants: Highschool students from Nieves

## Geographic reference

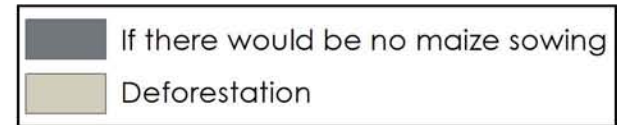
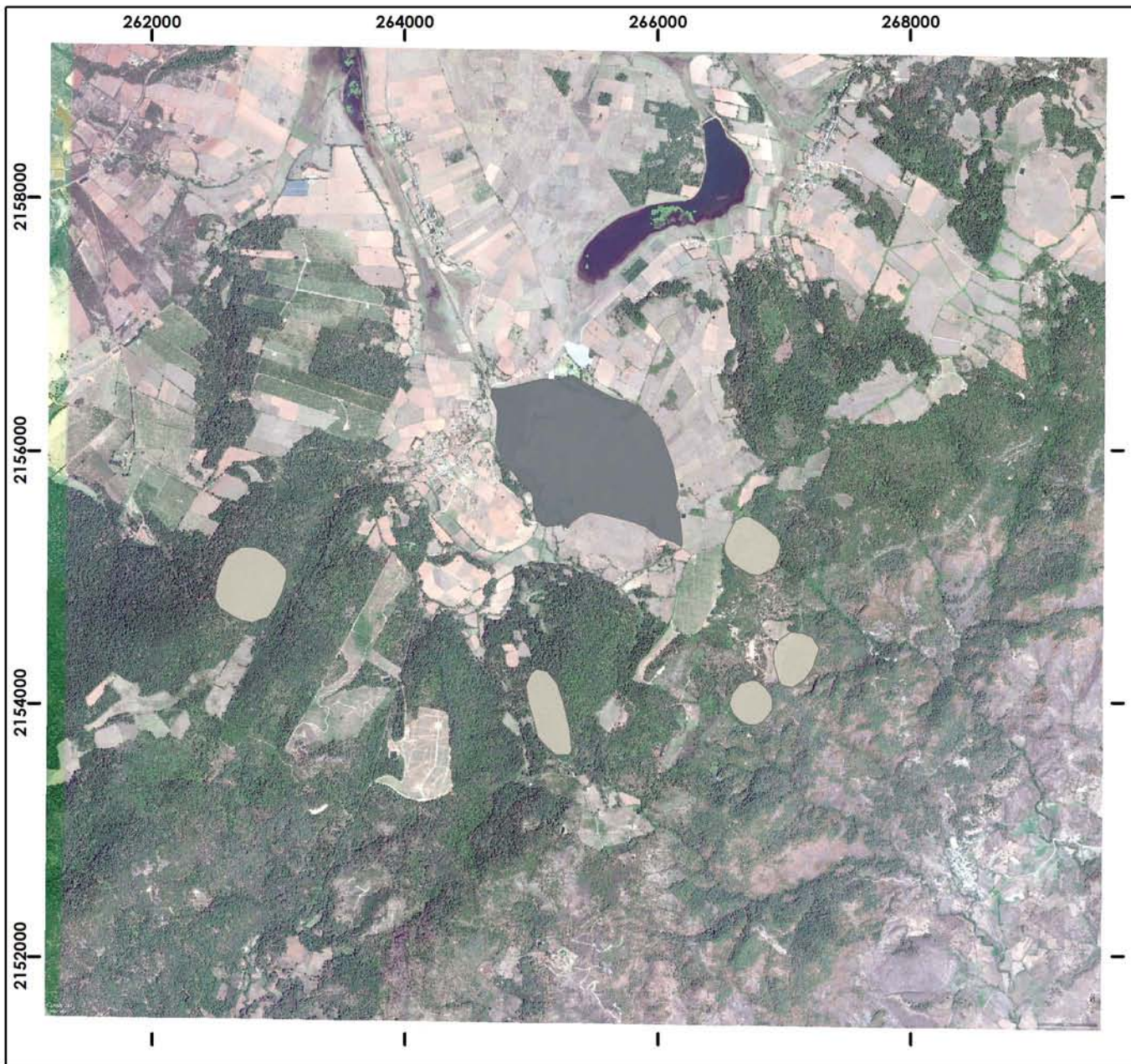
Google Earth Pro  
 Image 2015 DigitalGlobe



1:50,000



# Feared Land Use Changes Identified by Youngsters from Nieves



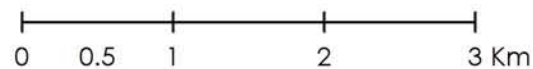
Spatial reference

Projection: UTM  
DATUM: WGS 84  
Zone: 14N  
10-11-2015

Author: Adrián Ortega Iturriaga  
Participants: Highschool students from Nieves

Geographic reference

Google Earth Pro  
Image 2015 DigitalGlobe



1:50,000



# Present Land Uses Identified by the Authorities of Nieves



1. Resin extraction from pines. Tree species: mainly pines, some oaks (white and grey), hawthorns and little oyamel. Each year wood extraction with permit (400ha of forest). Little extraction of oaks for firewood. Also used for mountain pasture. Remove fallen branches for firewood and to avoid fires.
2. "Las Pequeñas" Selling of land. Avocado and blueberry production and agriculture.
3. Sowing of maize, oats and wheat.
4. In the past it was used for used it for hydropower and irrigation of flower fields.

Spatial reference:

Proyection: UTM.  
 Datum: WGS 84.  
 Zone: 14 N.  
 24-09-2015

Author: Adrián Ortega Iturriaga.  
 Participants: President and Secretary of the "Comisariado" of Nieves.

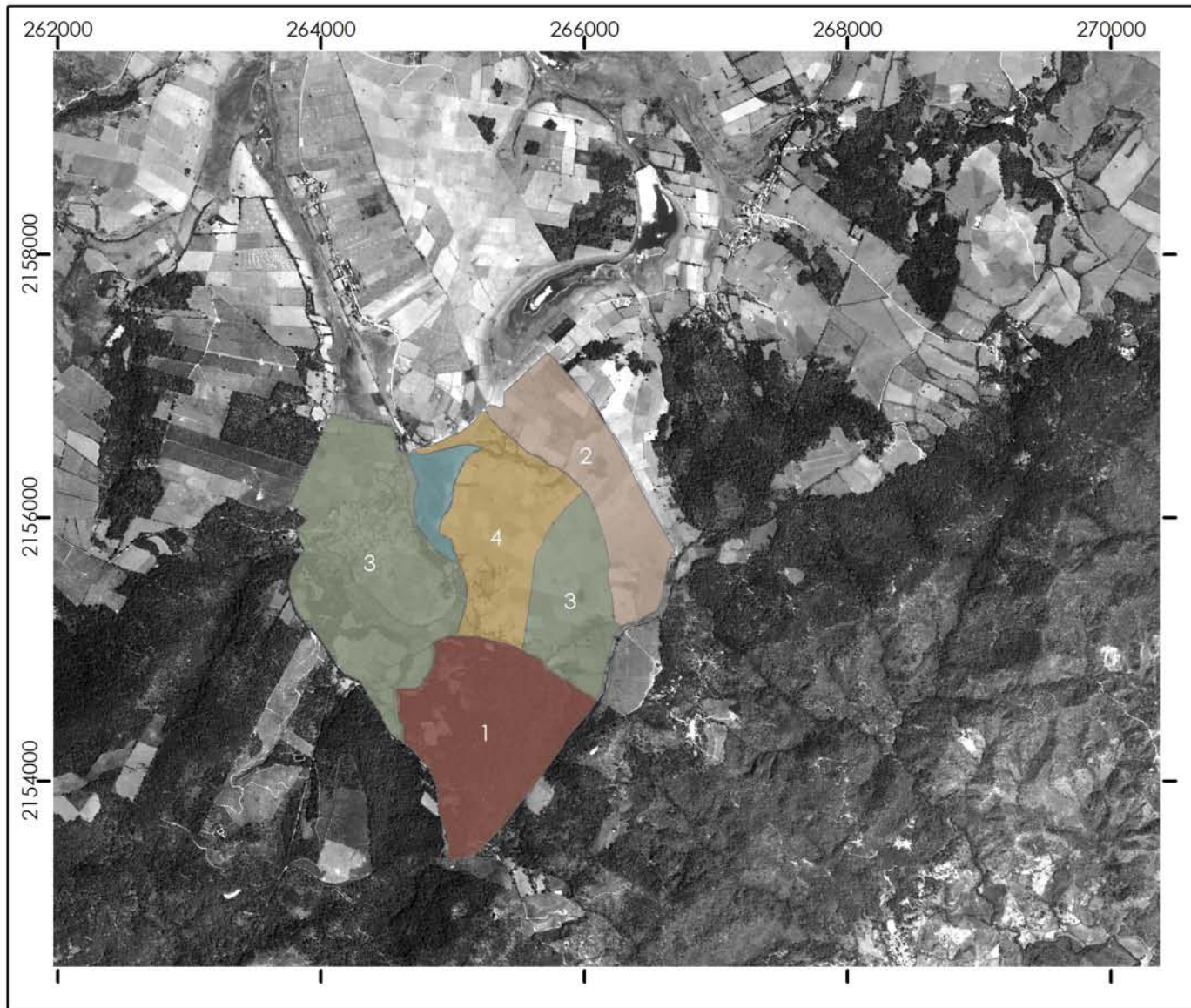


1:50,000





# Future Land Uses Identified by the Authorities of Nieves



1. Forest activities are expected to continue. Forest is at lesser risk to change to avocado orchards because it is under common management.
2. "Las Pequeñas" Selling of land. Avocado and cranberry production and agriculture.
3. These areas are believed to be at higher risk to change to avocado orchards.
4. This area is naturally protected from avocado expansion by having unsuitable climatic conditions for avocado growing.

Spatial reference:

Proyection: UTM.  
 Datum: WGS 84.  
 Zone: 14 N.  
 24-09-2015

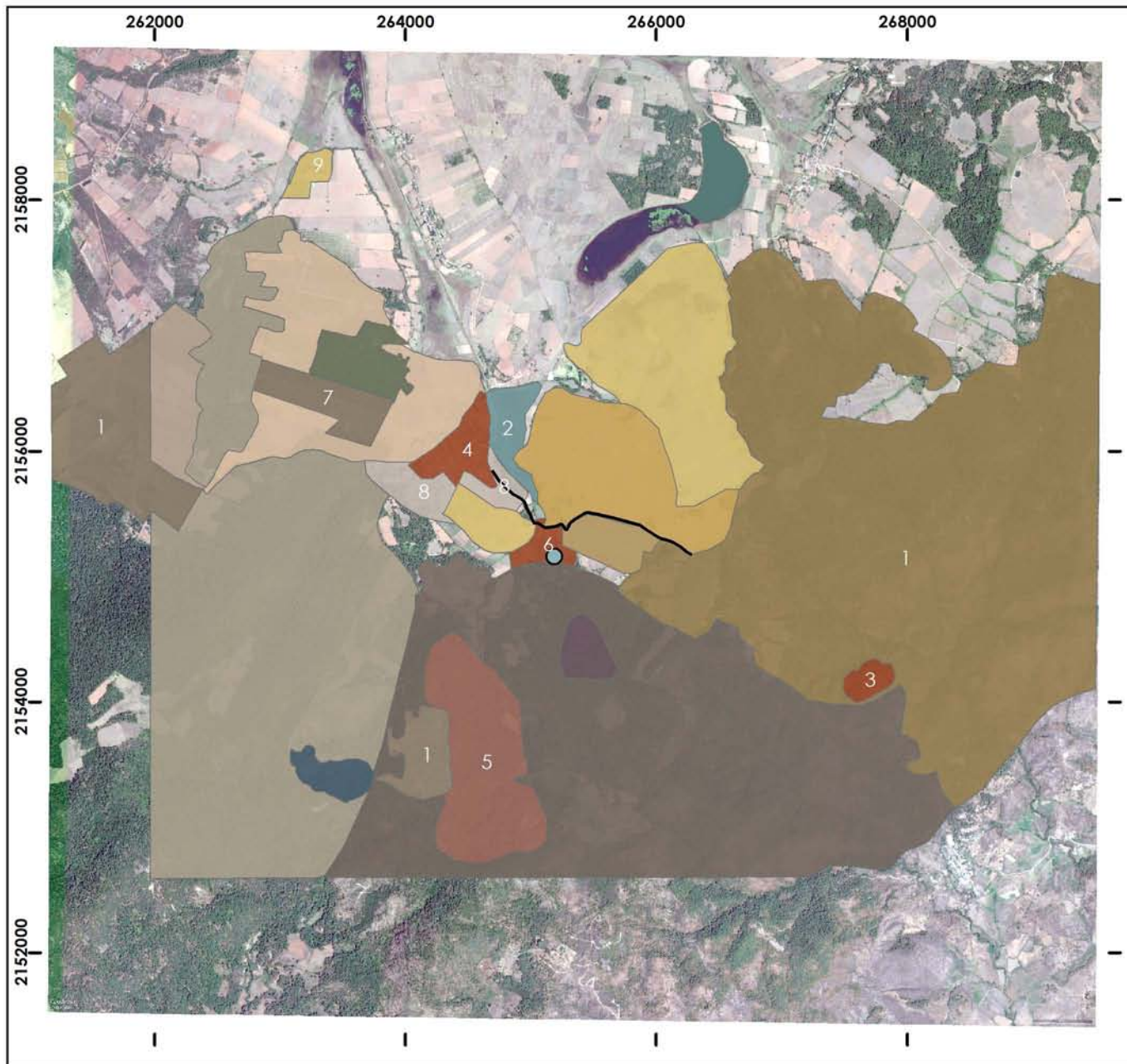
Author: Adrián Ortega Iturriaga.  
 Participants: President and Secretary of the "Comisariado" of Nieves.



1:50,000



# Past Land Uses Identified by the Community of Nieves



## Notes:

1. There used to be more pines.
2. They used to sow oats and before it was a dam.
3. There was a river and houses.
4. Less houses.
5. There were more animals.
6. There used to be houses.
7. There were pines. Forested area.
8. It was forest: mushroom and firewood gathering.
9. Greenhouses were not there.

PFNM1: resin, blackberries, mushrooms, trompas, firewood, ocote, soil, armadillos, squirrels & morning doves.

PFNM2: resin, blackberries, firewood, mushrooms & trompas.

PFNM3: resin, blackberries, mushrooms & trompas.

## Spatial reference

Projection: UTM  
 DATUM: WGS 84  
 Zone: 14N  
 16-11-2015

Author: Adrián Ortega Iturriaga  
 Participants: Women & highschool students from Nieves.

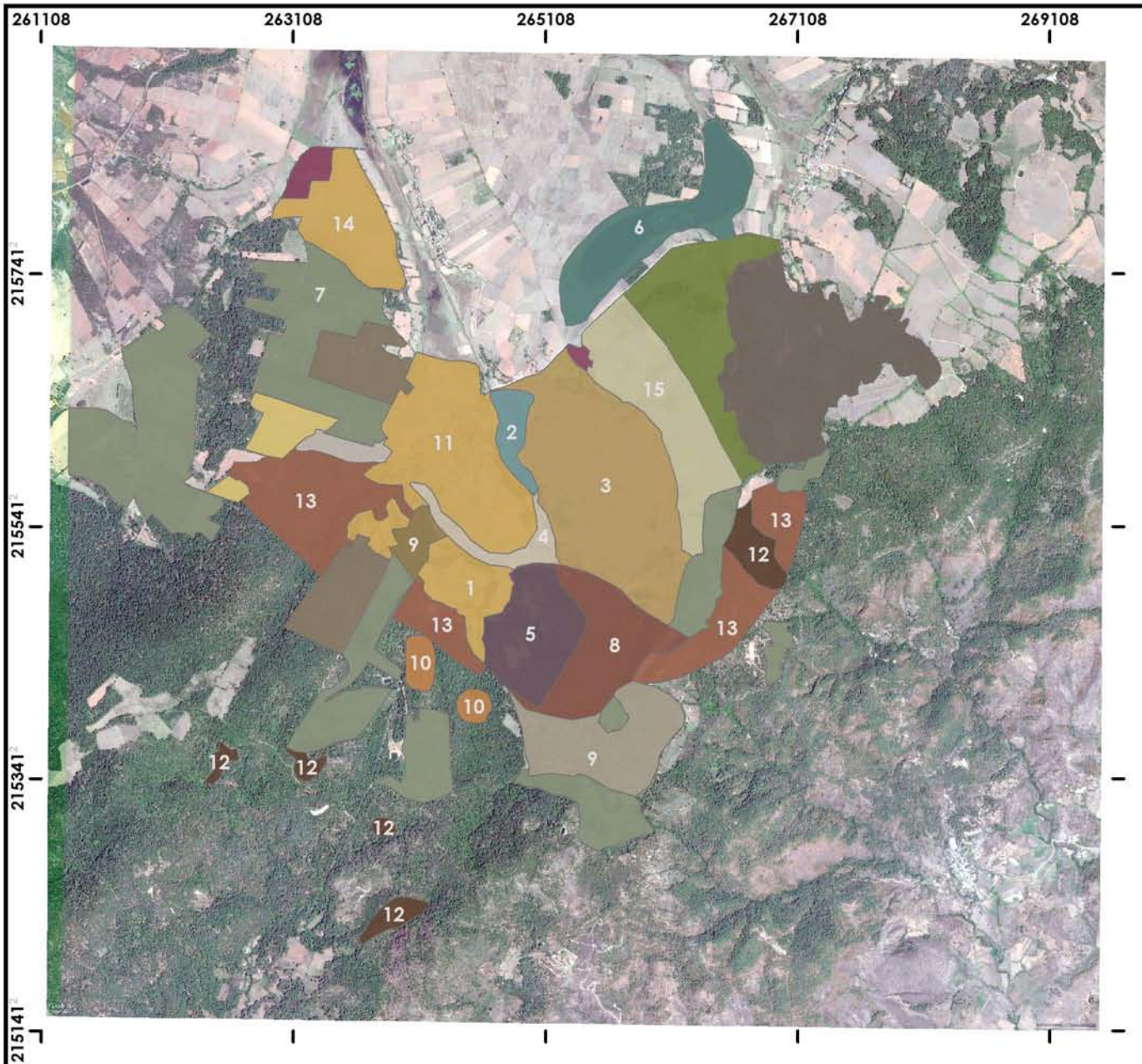


0 0.5 1 2 3 Km

1:50,000



# Present Land Uses Identified by the Community of Nieves



|  |                             |
|--|-----------------------------|
| Ejido                                  | Avocado orchard             |
| Blueberry orchard                      | Firewood and resin          |
| Firewood                               | Fishing                     |
| NTFP                                   | NTFP2                       |
| NTFP and livestock                     | Mushroom harvesting         |
| Resin and potting soil                 | Resin, firewood & livestock |
| Oat and livestock                      | Chillies sowing             |
| Maize                                  | Sowing and livestock        |
| Maize and avocado orchards             |                             |
| Maize, bean, barley and squash         |                             |
| Livestock and hydration of animals     |                             |
| Berries, firewood, resin and livestock |                             |

- Notes
1. One year maize & oat; the next pasture for livestock.
  2. "El Llano".
  3. One year maize, bean, barley & squash; the next pasture for livestock. 6 ha of reforestation.
  4. "La Ciénega".
  5. Berries, firewood and resin.
  6. Fishing of mojarras.
  7. Work.
  8. Extraction of resin & wood for selling and firewood for home consumption.
  9. Resin, firewood, berries, mushrooms, wood & lemon grass.
  10. Chillies under the canopy.
  11. One year maize, oat & wheat; the next pasture for livestock.
  12. Pine logging.
  13. Firewood, mushrooms and potting soil.
  14. Maize.
  15. "Las Pequeñas".

Spatial reference:

Projection: UTM  
 Datum: WGS 84  
 Zone: 14N  
 18-09-2015

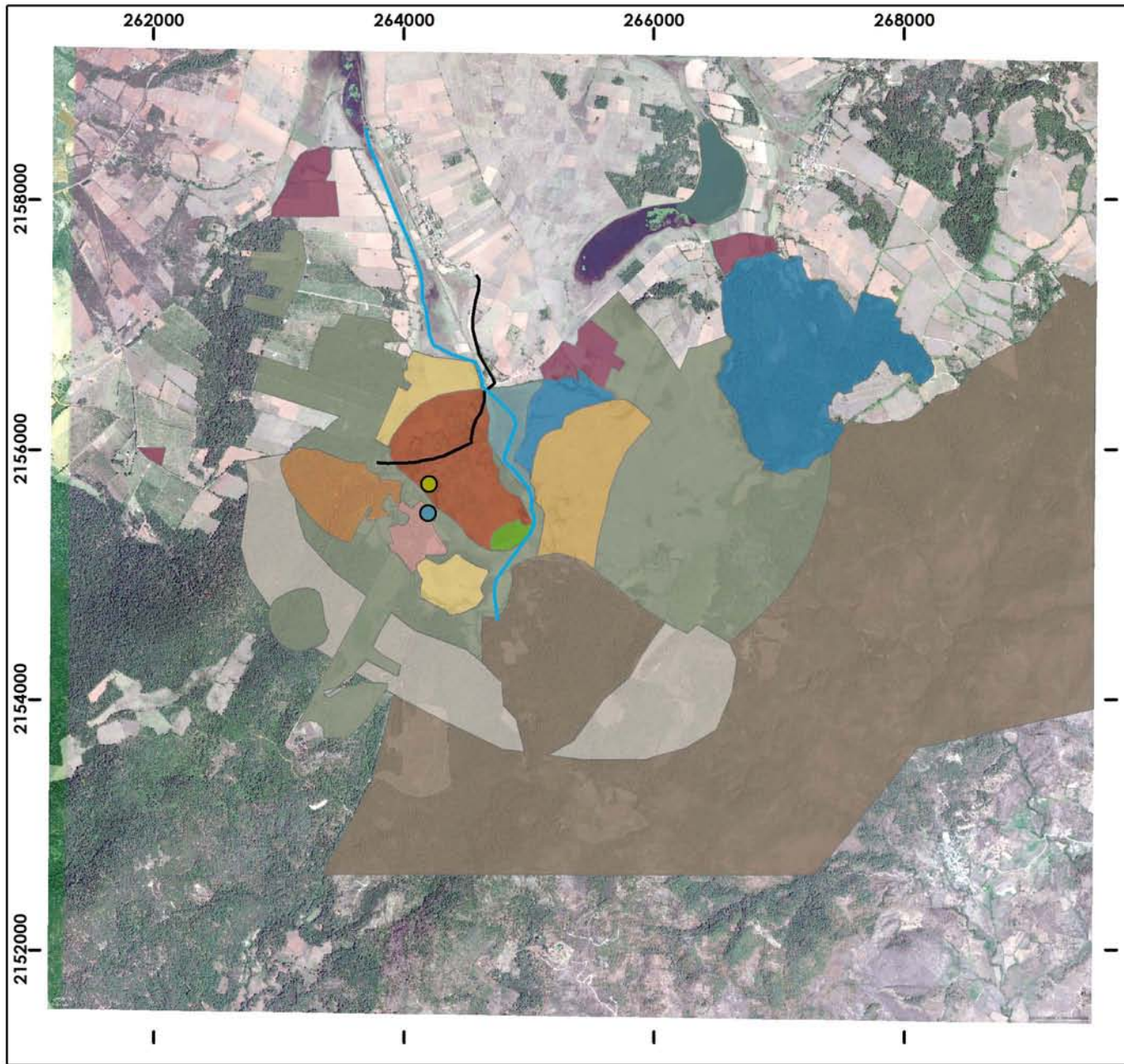
Author: Adrián Ortega Iturriaga  
 Women, men and students of the local highschool participated in the crafting of this map.



1:50,000



# Land Use Expectations Identified by the Community of Nieves



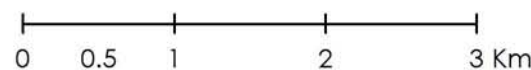
Spatial reference.

Projection: UTM.  
Datum: WGS 84.  
Zone: 14 N.  
12 - 03 - 2017

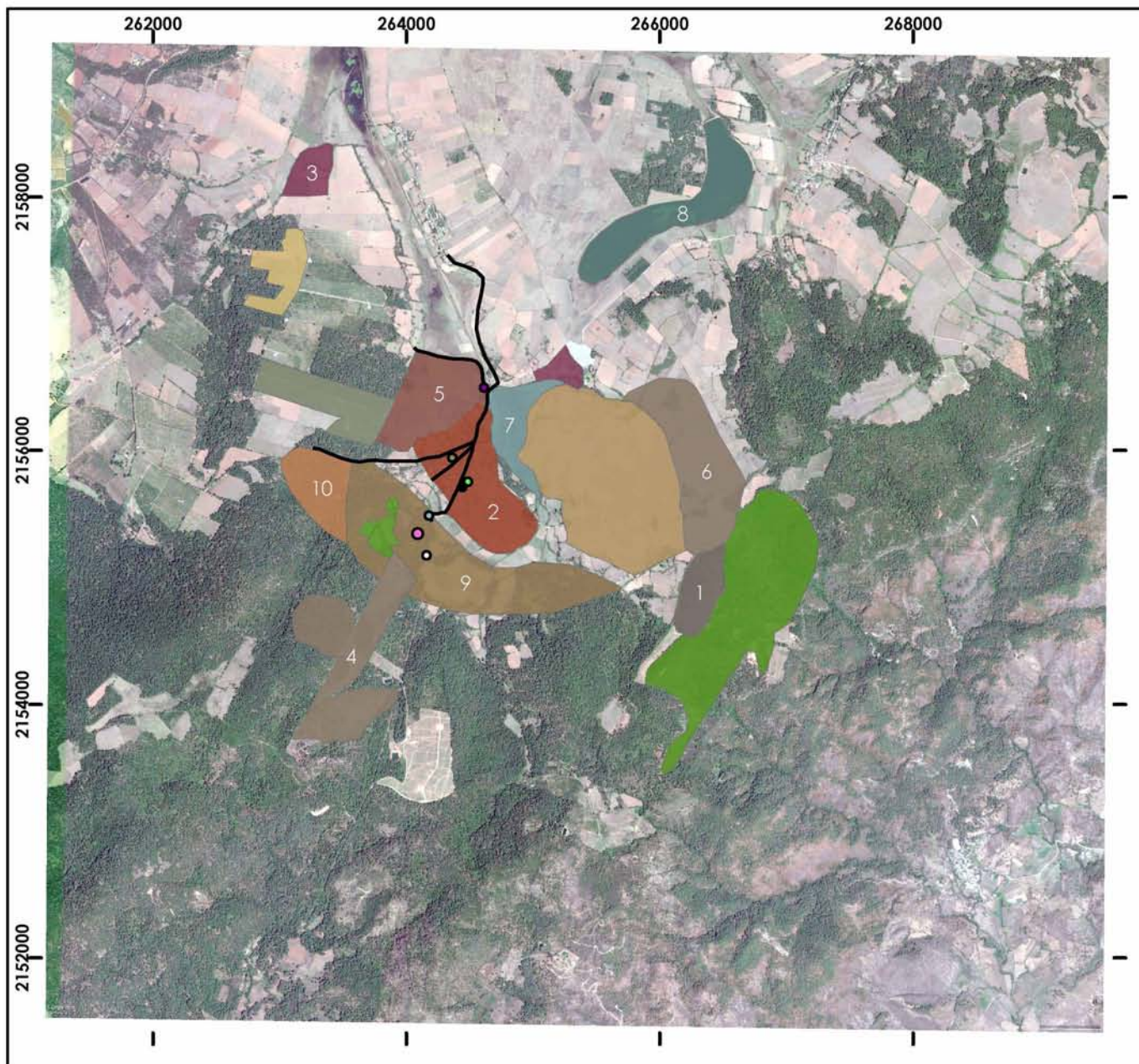
Author: Adrián Ortega Iturriaga.  
People from the community of Nieves participated in the production of this map.



1:50,000



# Ideal Land Use Expectations Identified by the Community of Nieves



|  |                               |  |                |
|--|-------------------------------|--|----------------|
|  | Avocado production            |  | Town           |
|  | Cranberry production          |  | Reforestation  |
|  | Chillies production           |  | Monte          |
|  | Monte and crops               |  | Resin          |
|  | Dam/Fishing                   |  | Dam            |
|  | NTFP gathering                |  | Sowing         |
|  | Maize, bean and squash sowing |  |                |
|  | Clean water                   |  | Water purifier |
|  | Antenna                       |  | Sports unit    |
|  | Gas station                   |  | Área verde     |
|  | Park                          |  | Paved road     |

Notes

1. Resin extraction.
2. More people. Bigger town.
3. Cranberry and blackberry orchards.
4. More monte, pines, more animals. Reduce orchards from outsiders.
5. Pines, more trees, more animals, maize sowing.
6. Pines, more trees, more animals.
7. Rehabilitate dam to have water.
8. That it grows.
9. Gather mushrooms and firewood closer.
10. Chillie orchards.

Spatial reference

Projection: UTM  
 DATUM: WGS 84  
 Zone: 14N  
 12-11-2015

Author: Adrián Ortega Iturriaga  
 Participants: Women and highschool students from Nieves



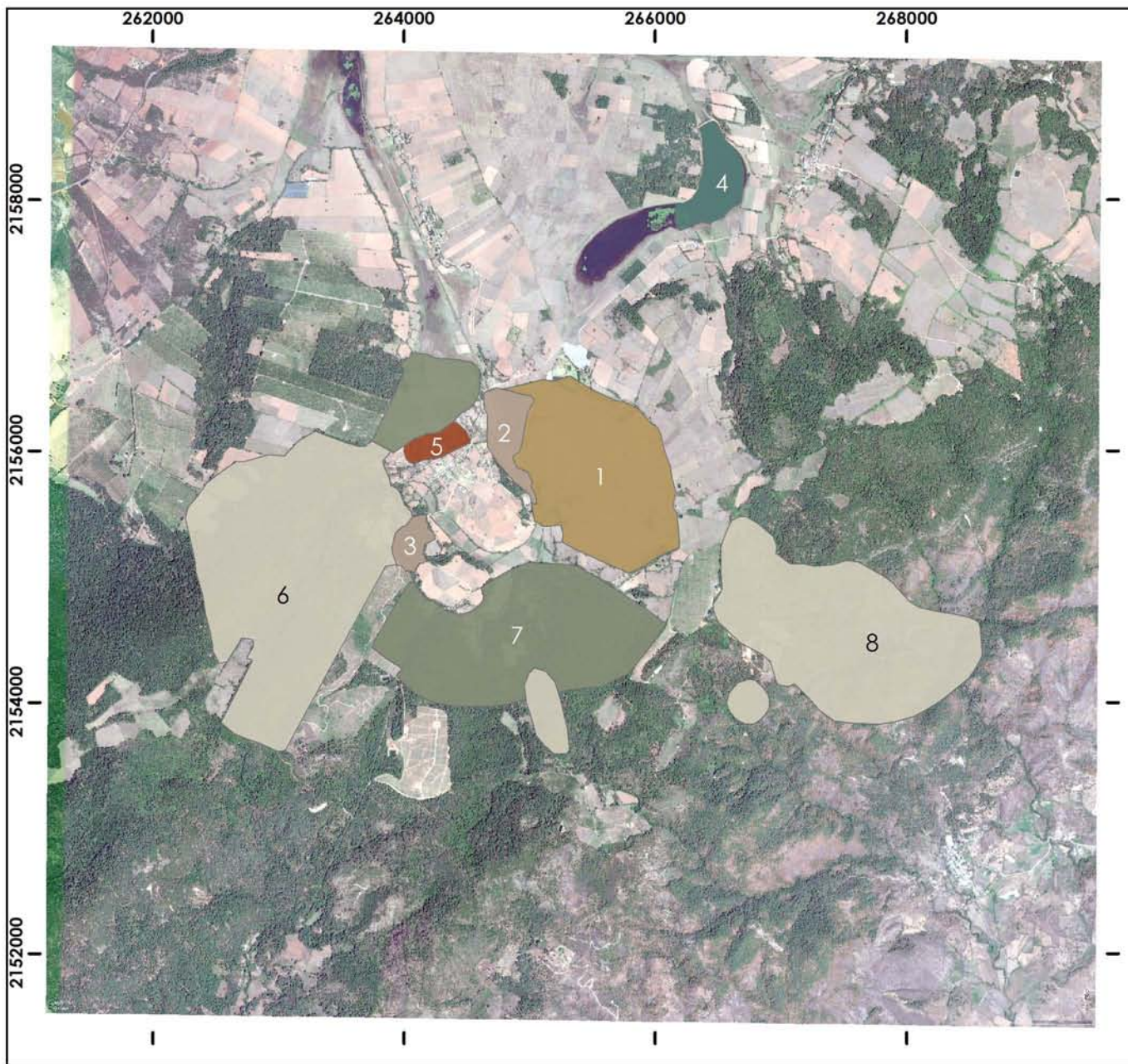
1:50,000

Geographic reference

Google Earth Pro  
 Image 2015 DigitalGlobe



# Feared Land Use Changes Identified by the Community of Nieves



## Notas

1. If lack of water affects agriculture production.
2. If the lagoon dries definitely.
3. If springs dry.
4. If good fishing stops.
5. Less people.
6. If the monte disappears.
7. If more orchards settle.
8. Illegal logging.

## Spatial reference

Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 14-11-2015

Author: Adrián Ortega Iturriaga.  
 Participants: Women and highschool students of Nieves.

## Geographic reference

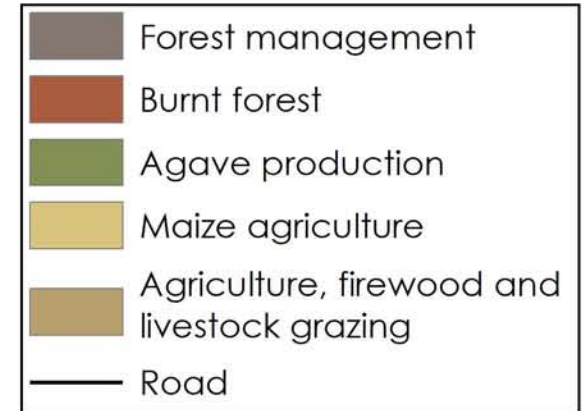
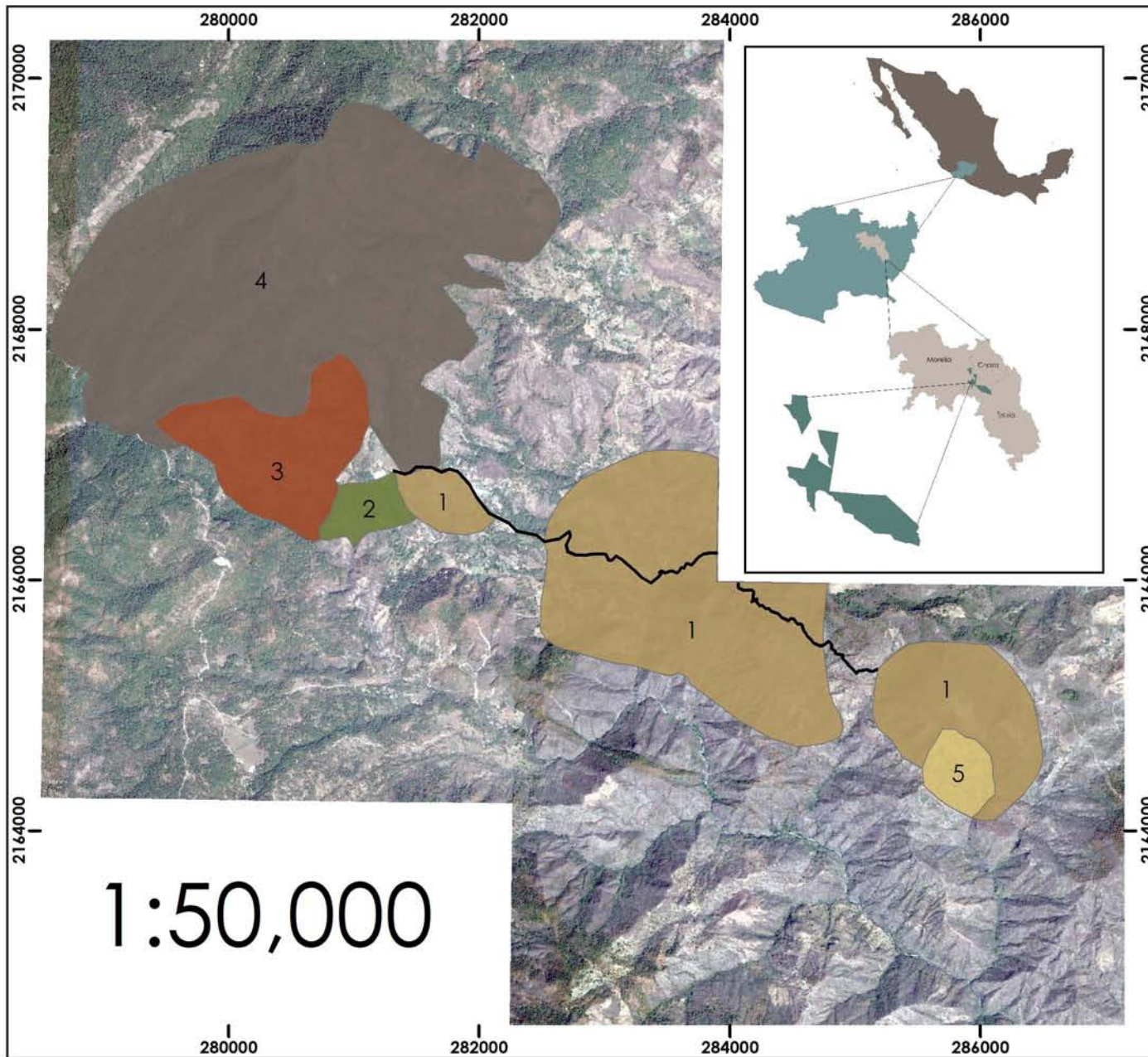
Google Earth Pro Image 2015 DigitalGlobe



1:50,000

TUMBISCA

# Present Land Uses Identified by Landholders of the Locality of Tumbisca



## Notes

1. Mainly maize growing and beans, firewood from dry trees and livestock grazing after season.
2. People are starting to plant agave, testing in 1 or 1.5 ha.
3. A big fire wiped out a big area of forest that is now unused.
4. Resin is the main productive activity. In the forest they also gather firewood from dry trees and berries, and develop agriculture and livestock grazing.
5. El Epazote and El Violín localities.

## Spatial reference

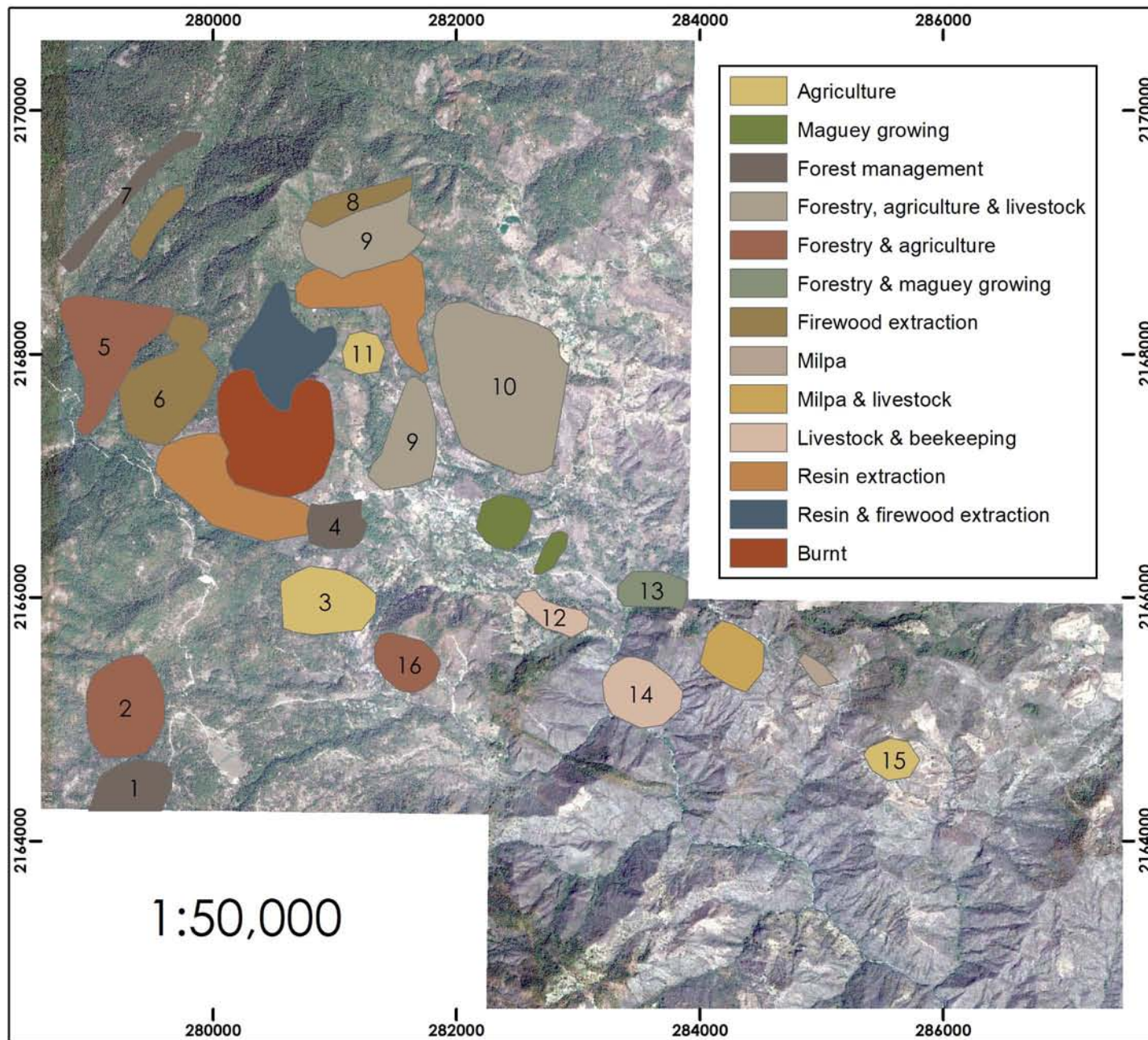
Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 June 2016

Author: Adrián Ortega Iturriaga  
 Landholders from the locality of Tumbisca participated in the production of this map.





# Present Land Uses Identified by Boys of the Locality of Tumbisca



## Notes

1. "La Lobera": resin, dry wood & from plagued trees, maguey and soil.
2. "Bellotal": wood & maguey.
3. "Las Chorradas": tomato, avocado, peach, banana and milpa.
4. Resin, soil and firewood.
5. Resin, firewood, maize, squash and maguey.
6. "El Campanario" & "La Cantera"
7. Resin, firewood and mushrooms.
8. "El Calabozo".
9. Resin, livestock and milpa.
10. Monte, livestock, maize, bean and mourning dove hunting.
11. "Amoles": water intake and peach, avocado, banana & guava orchards.
12. "El Llano".
13. "Paso Tendido": fresh water.
14. "Cerro de las Ánimas".
15. Maize, bean and maguey.
16. Milpa, maguey, resin & firewood.

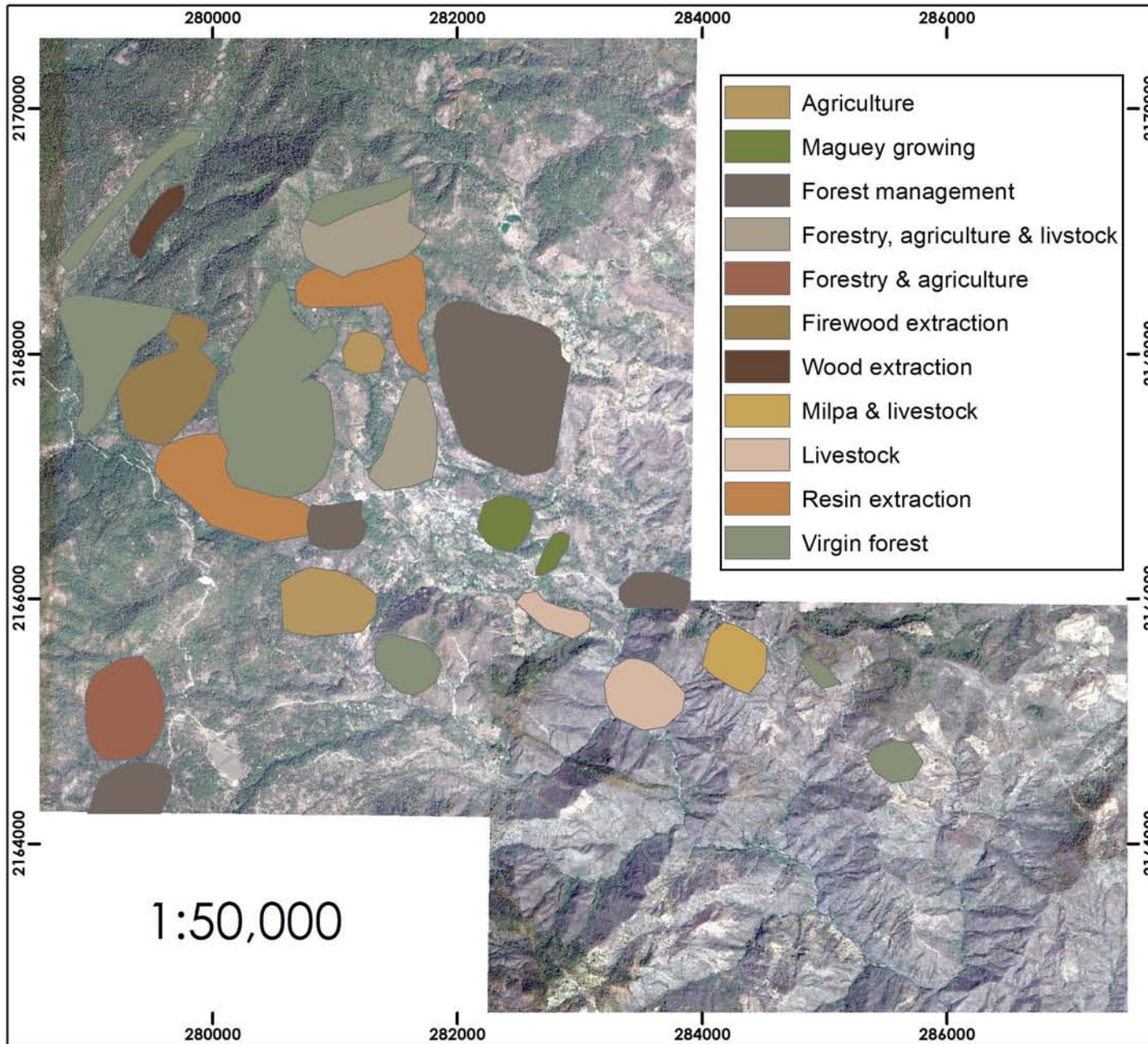
## Spatial reference

Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 June 2016

Author: Adrián Ortega Iturriaga  
 Boys who attend school at locality of Tumbisca participated in the production of this map.



# Past Land Uses Identified by Boys of the Locality of Tumbisca



## Notes

1. "La Lobera": The area was reforested.
2. "Bellotal": Pines have been lost due to plagues and logging.
3. Has not changed.
4. No soil and firewood extraction.
5. Area had not been burnt.
6. Less logging, it had not been burnt.
7. It was burnt.
8. Forest clearing.
9. There used to be some houses and no maize growing.
10. Without agriculture and no hunting.
11. No water intake nor avocado growing.
12. Area had not been burnt.
13. No bees.
14. No maguey growing.

## Spatial reference

Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 June 2016

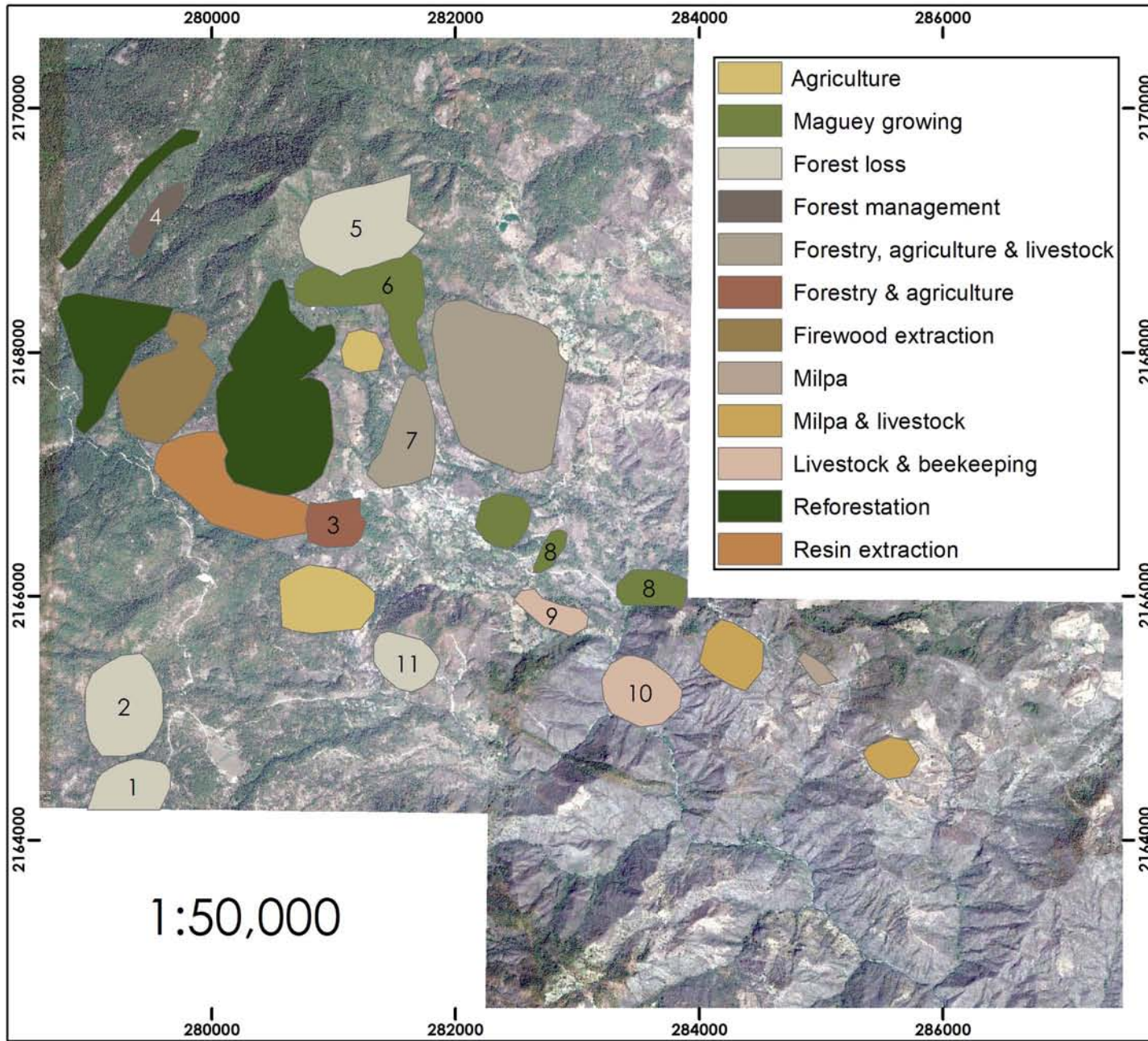
Author: Adrián Ortega Iturriaga  
 Boys who attend school at locality of Tumbisca participated in the production of this map.



0 0.5 1 2 3 Km



# Future Land Use Expectations Identified by Boys of the Locality of Tumbisca

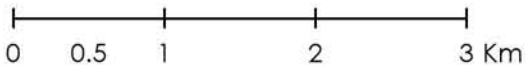


- Notes
1. Less forest due to pests.
  2. Deforestation & pests.
  3. More agriculture.
  4. Young forest.
  5. Maguey growing, agriculture & livestock.
  6. 1/4 will change to maguey.
  7. More livestock.
  8. More maguey.
  9. More bees and livestock.
  8. More maguey.
  10. More bees.
  11. Agriculture & fire risk.

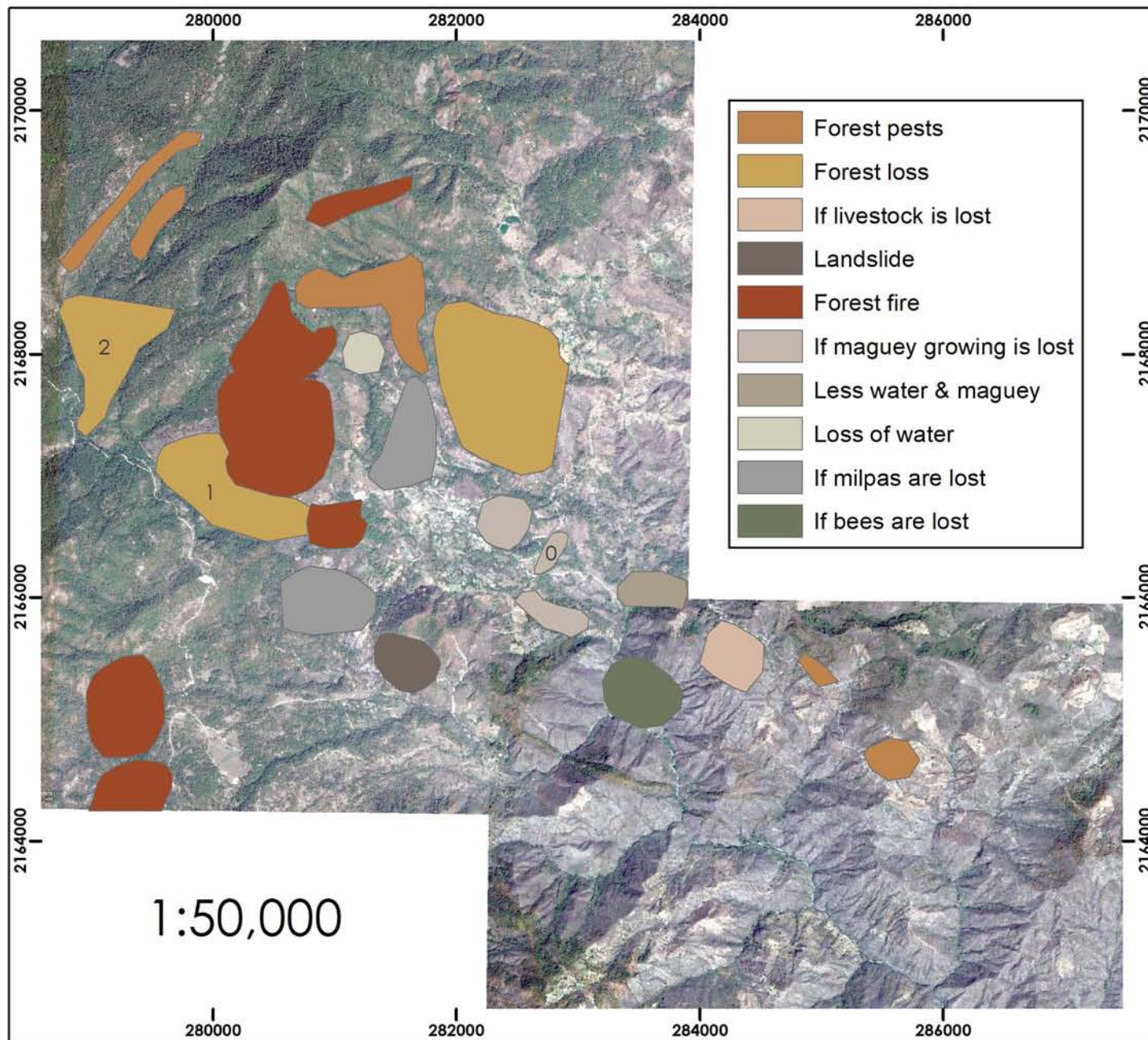
Spatial reference

Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 June 2016

Author: Adrián Ortega Iturriaga  
 Boys who attend school at locality of Tumbisca participated in the production of this map.



# Feared Land Use Expectations Identified by Boys of the Locality of Tumbisca



## Notes

1. Pine trees deforestation.
2. If the forest dries & less hunting.
3. If mezcal production decreases.

## Spatial reference

Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 June 2016

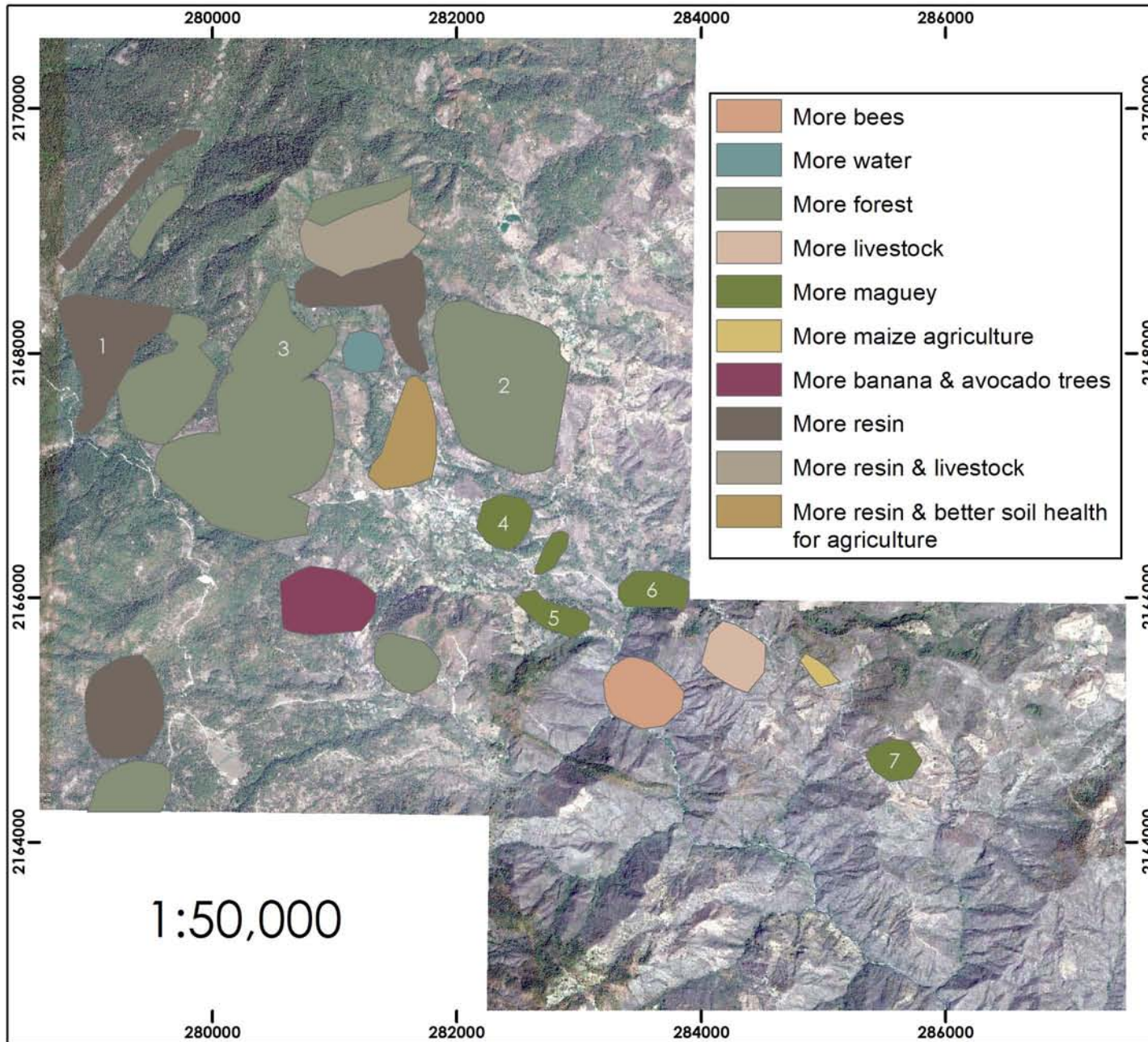
Author: Adrián Ortega Iturriaga  
 Boys who attend school at locality  
 of Tumbisca participated in the production  
 of this map.



0 0.5 1 2 3 Km



# Ideal Land Use Expectations Identified by Boys of the Locality of Tumbisca



Notes

1. More deers.
2. More mourning doves.
3. That the forest continues to recover from fire.
4. More production of mezcal.
5. More bees.
6. More water.
7. More milpa.

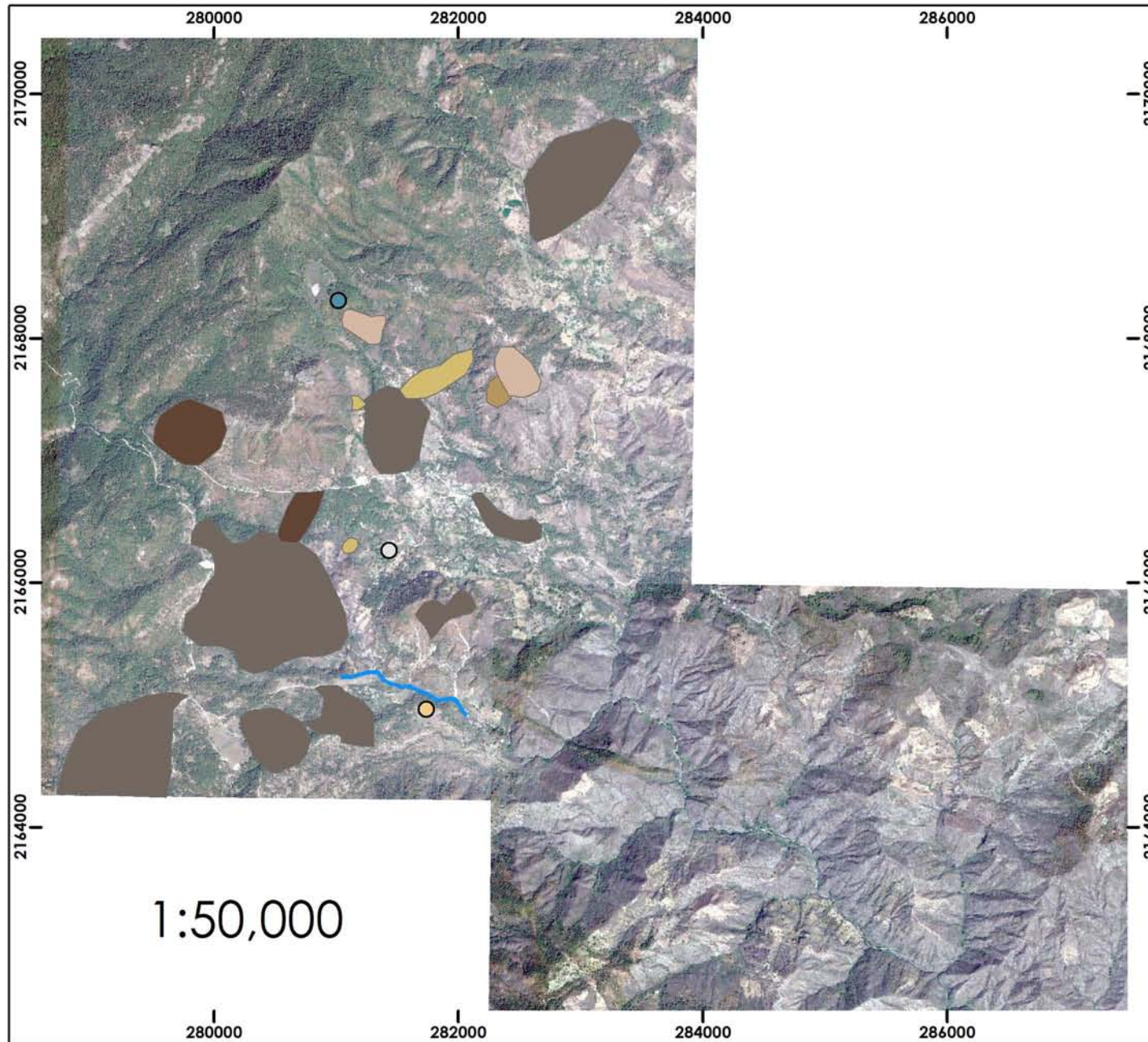
Spatial reference

Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 June 2016

Author: Adrián Ortega Iturriaga  
 Boys who attend school at locality of Tumbisca participated in the production of this map.



# Present Land Uses Identified by Girls of the Locality of Tumbisca



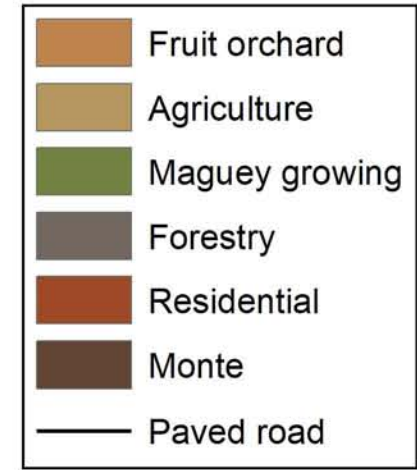
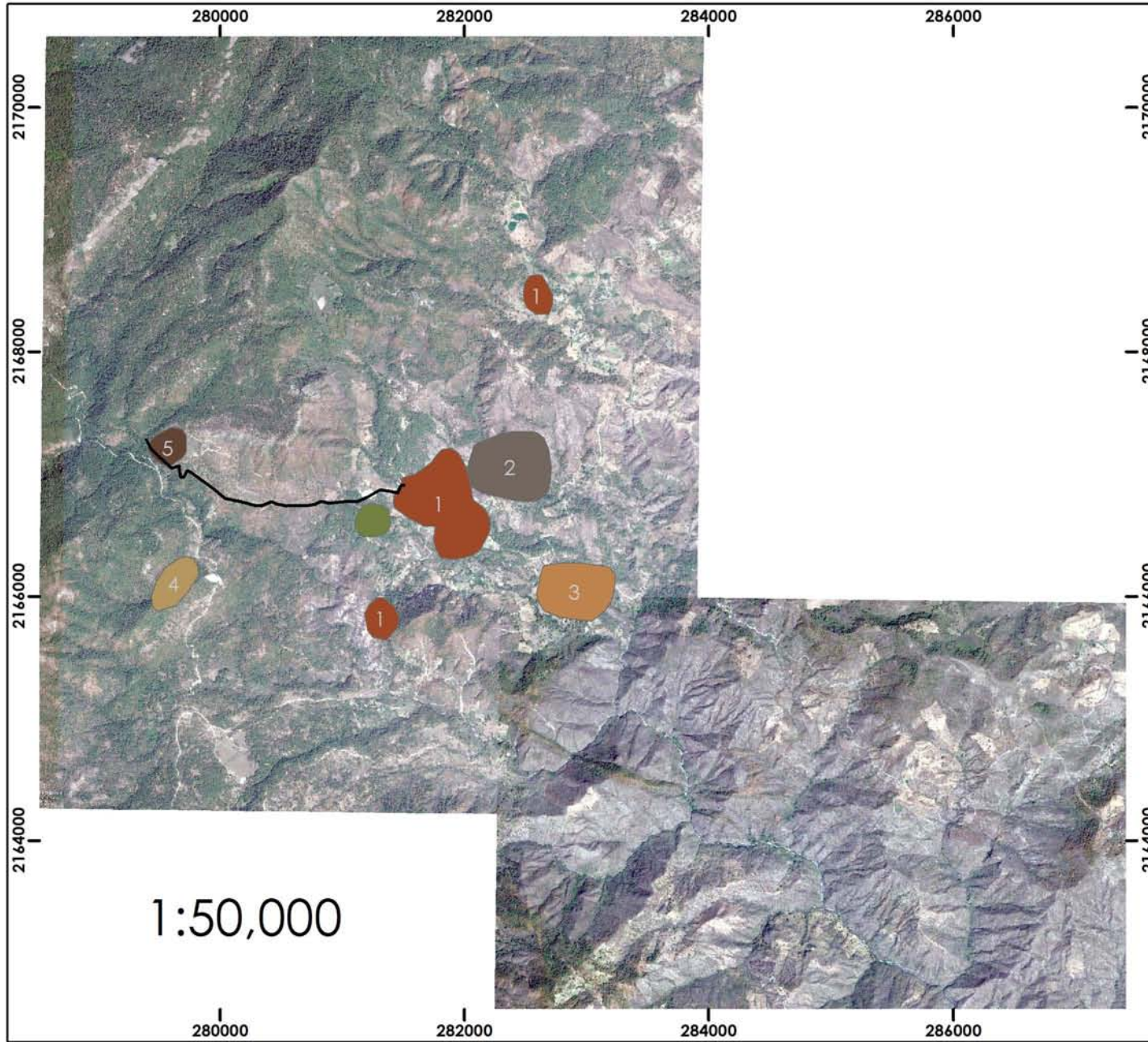
Spatial reference

Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 June 2016

Author: Adrián Ortega Iturriaga  
 Girls who attend school at locality  
 of Tumbisca participated in the production  
 of this map.



# Future Land Use Expectations Identified by Girls of the Locality of Tumbisca



- Notes
1. More houses.  
More people is going to arrive.
  2. Less forest.
  3. Lime, orange & mango trees.
  4. More milpa.
  5. Forest will recover from fire.

Spatial reference

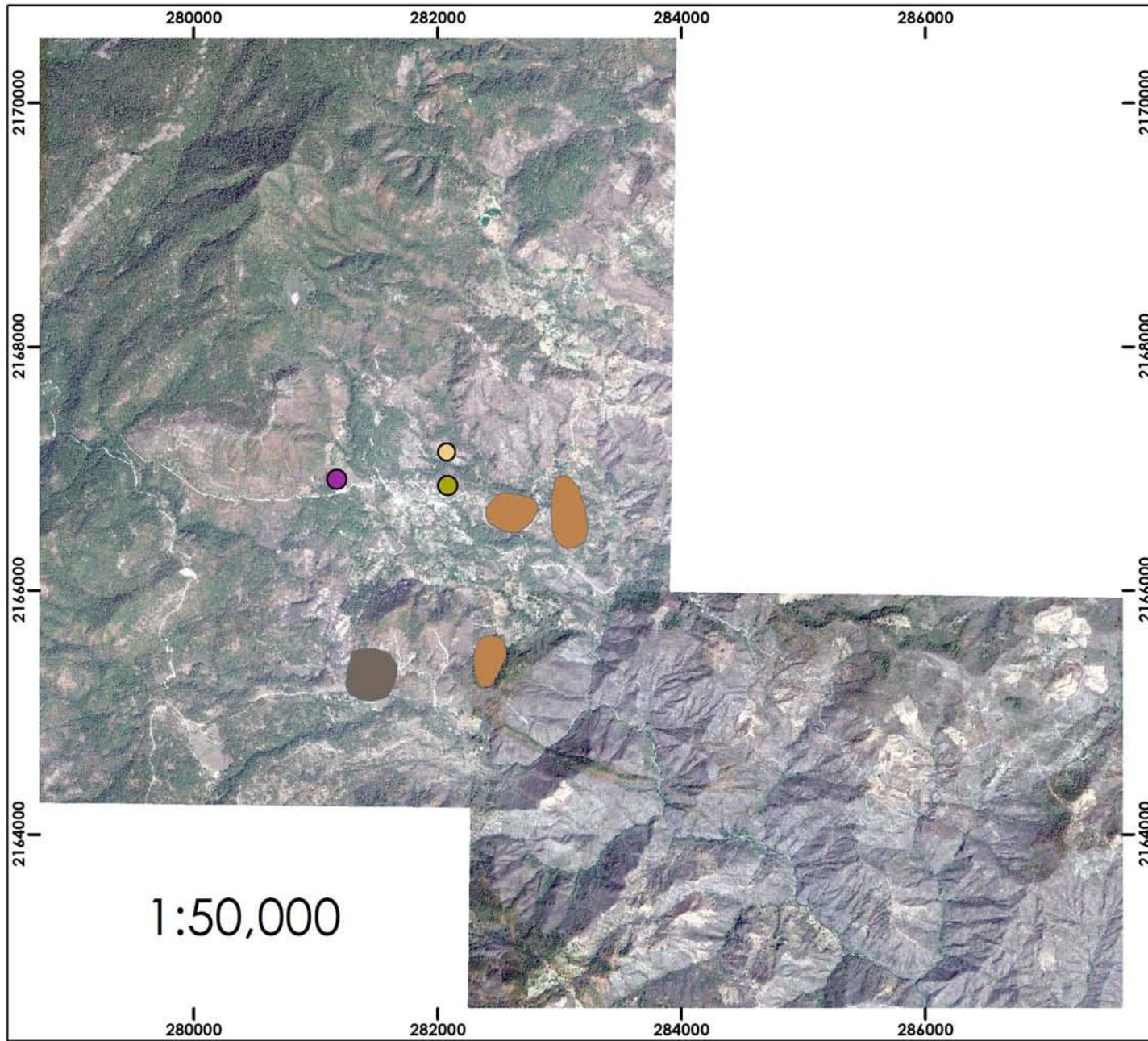
Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 June 2016

Author: Adrián Ortega Iturriaga  
 Girls who attend school at locality of Tumbisca participated in the production of this map.

1:50,000



# Ideal Land Use Expectations Identified by Girls of the Locality of Tumbisca



- Forestry
- Fruit trees orchard
- Residential
- Sports court
- Leisure (kiosk, small shops)

The fruit trees that are wished are: apple & mango.

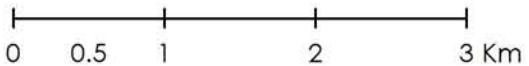
A strong desire is to have more forest, and have clean air.

More houses is related to more people in town. Feeling that the town is less lonely is perceived as something positive.

Spatial reference

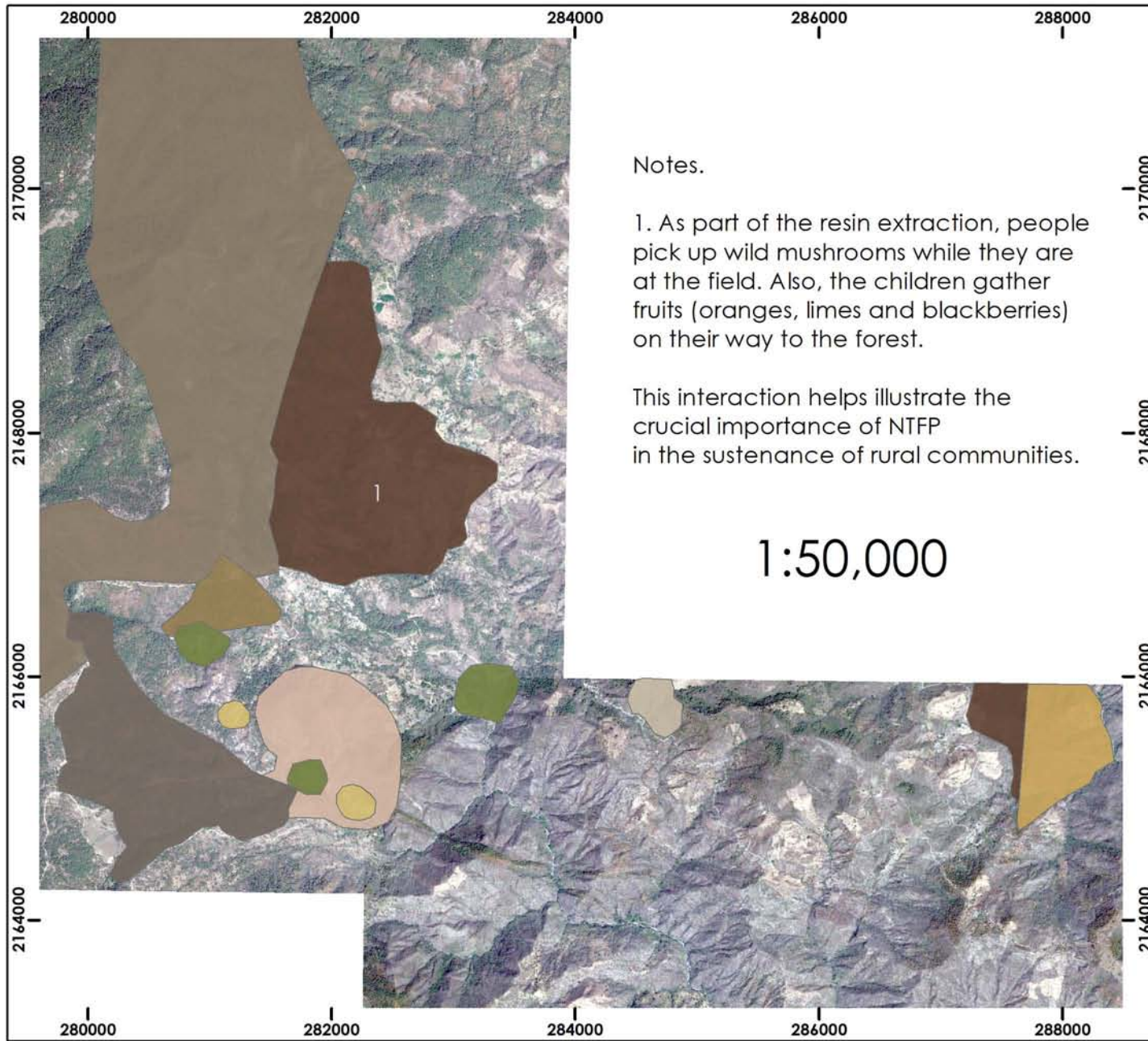
Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 June 2016

Author: Adrián Ortega Iturriaga  
 Girls who attend school at locality of Tumbisca participated in the production of this map.





# Present Land Uses Identified by Mixed Group of the Locality of Tumbisca



**Notes.**

1. As part of the resin extraction, people pick up wild mushrooms while they are at the field. Also, the children gather fruits (oranges, limes and blackberries) on their way to the forest.

This interaction helps illustrate the crucial importance of NTFP in the sustenance of rural communities.

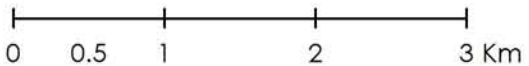
1:50,000



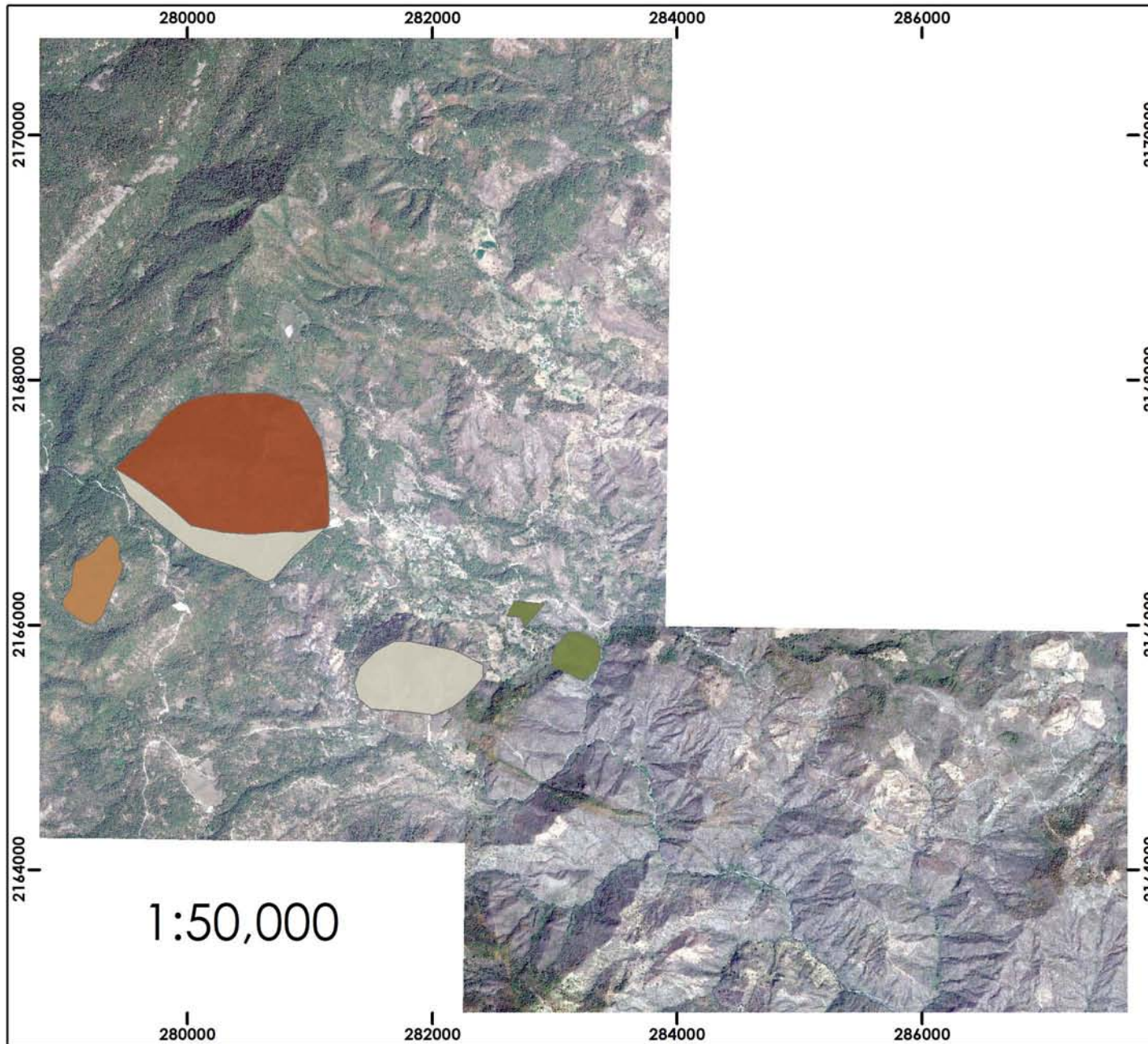
**Spatial reference**

Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 June 2016

Author: Adrián Ortega Iturriaga  
 Girls & boys who attend school at locality of Tumbisca participated in the production of this map.



# Past Land Uses Identified by Mixed Group of the Locality of Tumbisca

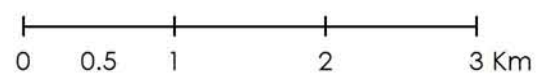


-  People used to do forest management, now is useless because of a forest pest
-  There used to be forest management, they clear to grow agave.
-  It was burnt from an old fire
-  Most recent fire. It is still under recovery

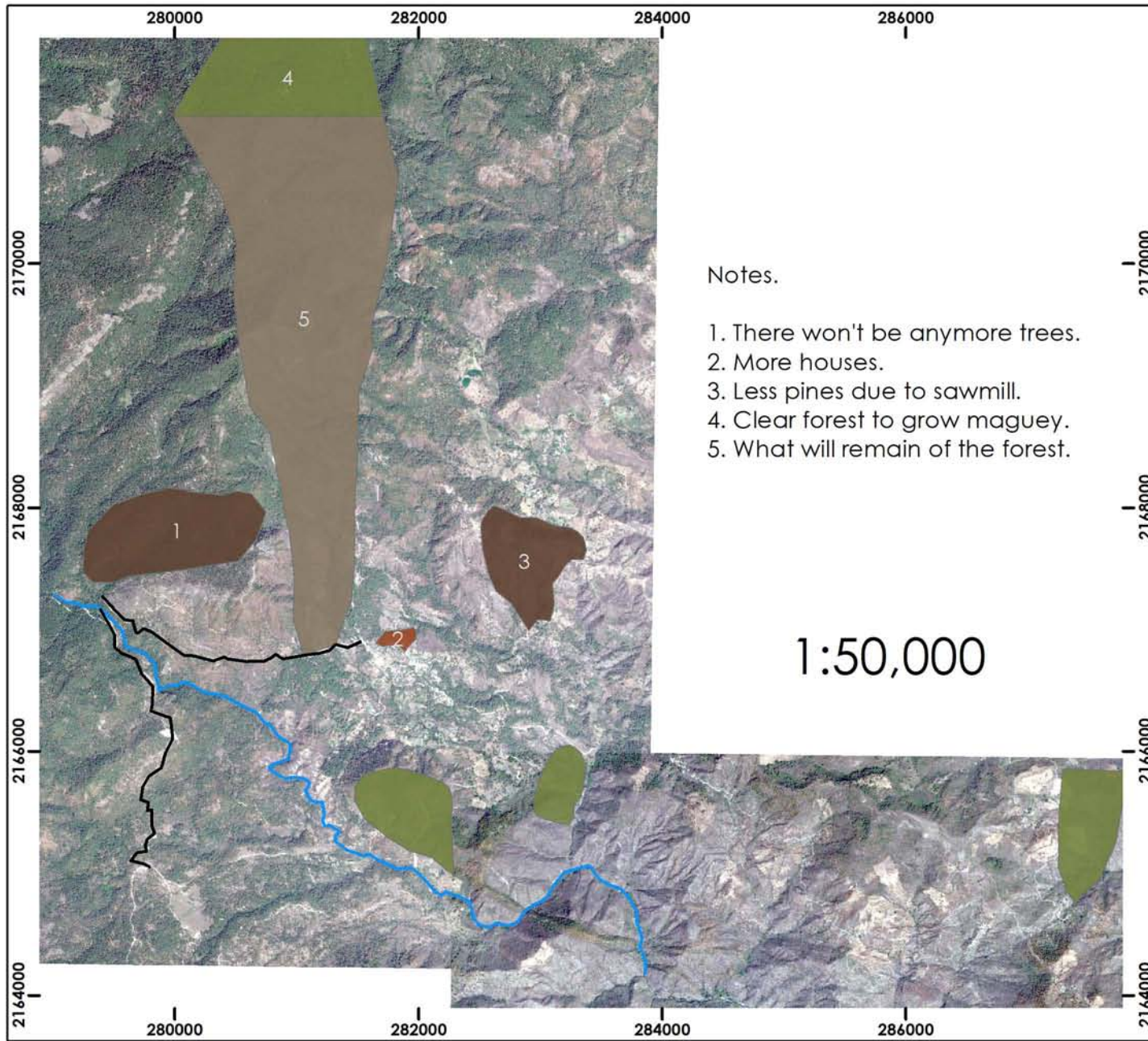
Spatial reference

Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 June 2016

Author: Adrián Ortega Iturriaga  
 Girls & boys who attend school at locality of Tumbisca participated in the production of this map.



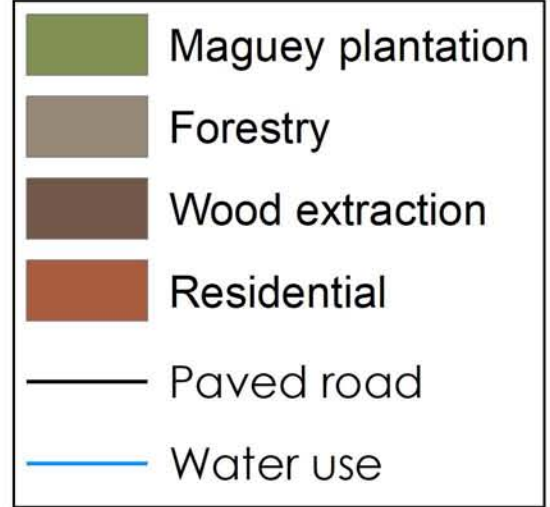
# Future Land Use Expectations Identified by Mixed Group of Locality of Tumbisca



Notes.

1. There won't be anymore trees.
2. More houses.
3. Less pines due to sawmill.
4. Clear forest to grow maguey.
5. What will remain of the forest.

1:50,000



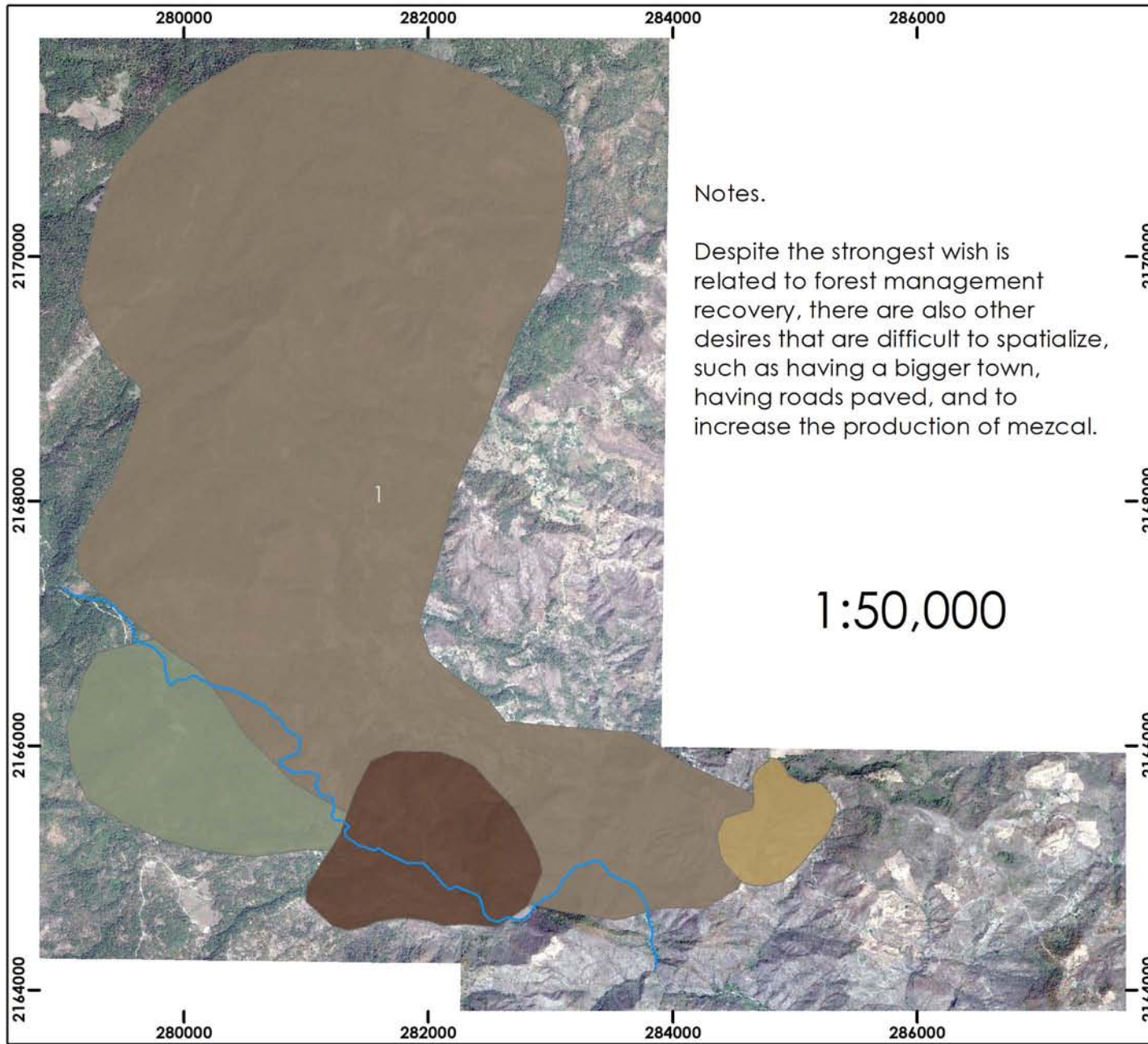
Spatial reference

Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 June 2016

Author: Adrián Ortega Iturriaga  
 Girls & boys who attend school at locality of Tumbisca participated in the production of this map.



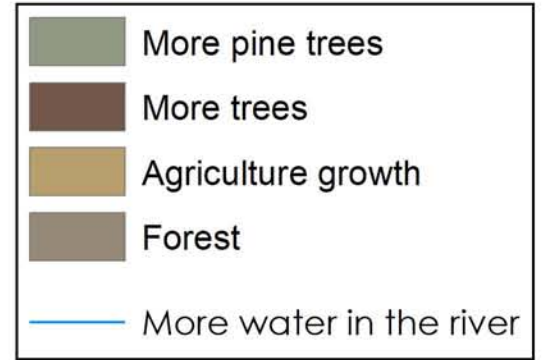
# Ideal Land Use Expectations Identified by Mixed Group of Locality of Tumbisca



## Notes.

Despite the strongest wish is related to forest management recovery, there are also other desires that are difficult to spatialize, such as having a bigger town, having roads paved, and to increase the production of mezcal.

1:50,000



## Spatial reference

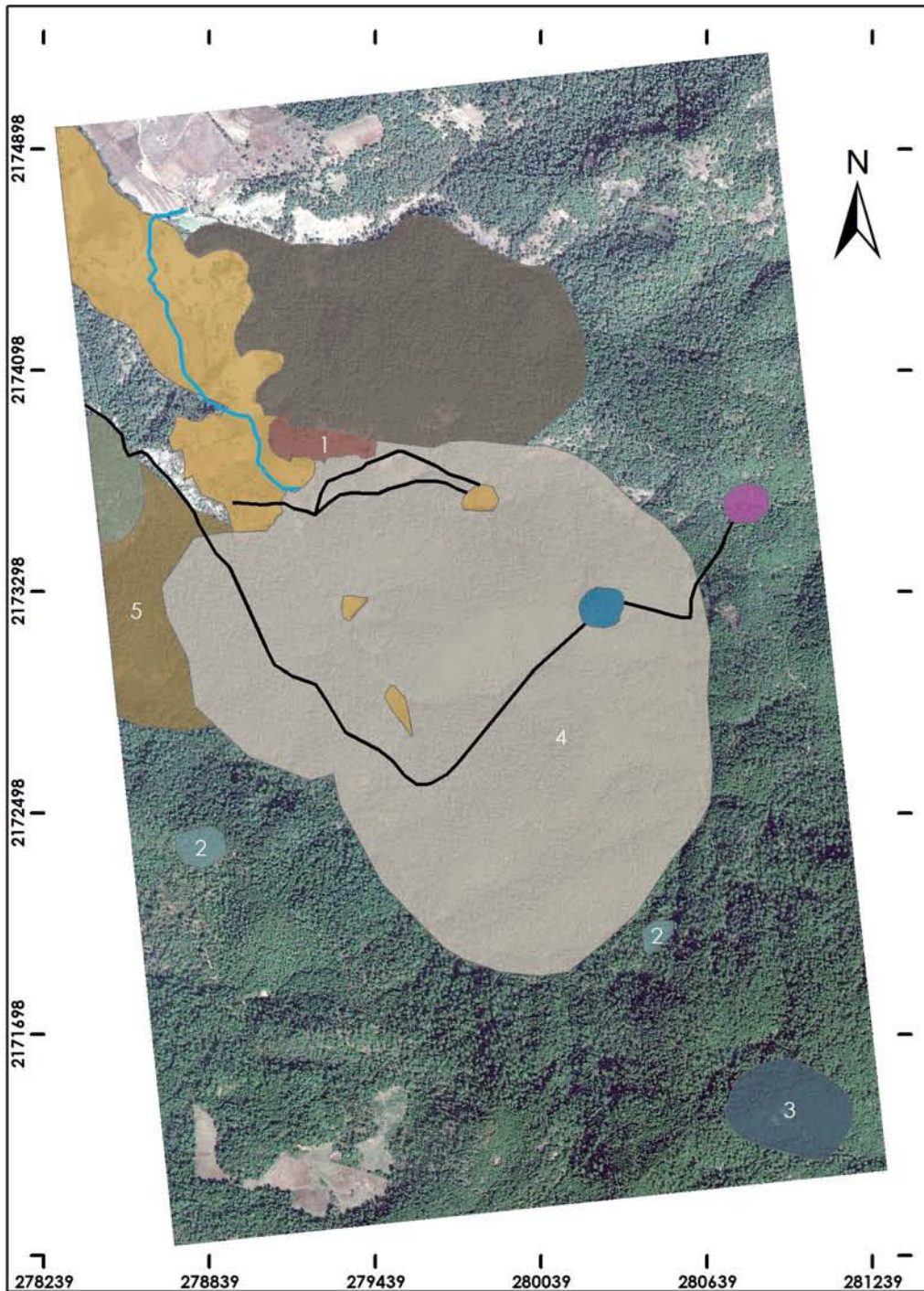
Projection: UTM.  
 DATUM: WGS 84.  
 Zone: 14 N.  
 June 2016

Author: Adrián Ortega Iturriaga  
 Girls & boys who attend school at locality of Tumbisca participated in the production of this map.



L  
A  
U  
R  
E  
L  
I  
T  
O

# Present Land Uses Identified by Women from Laurelito



## Notes

1. Cows.
2. Spring.
3. Cerro azul.
4. Firewood, soil, resin and logs.
5. Berries, hawthorn, laurel and arnica

## Spatial reference

Projection: UTM  
 DATUM: WGS 84  
 Zone: 14N  
 04-29-2015  
 Author: Adrián Ortega Iturriaga  
 Participants: women from the locality  
 of Laurelito.

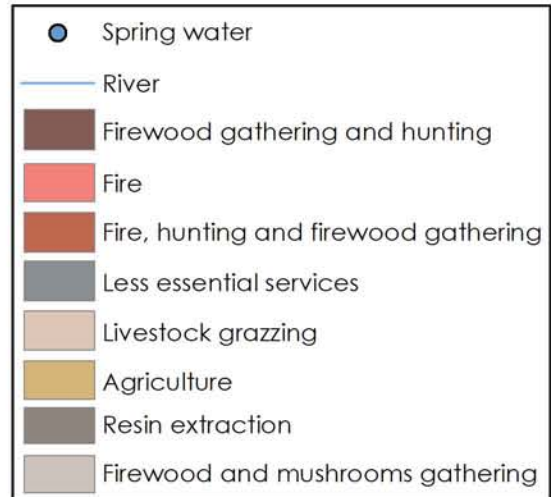
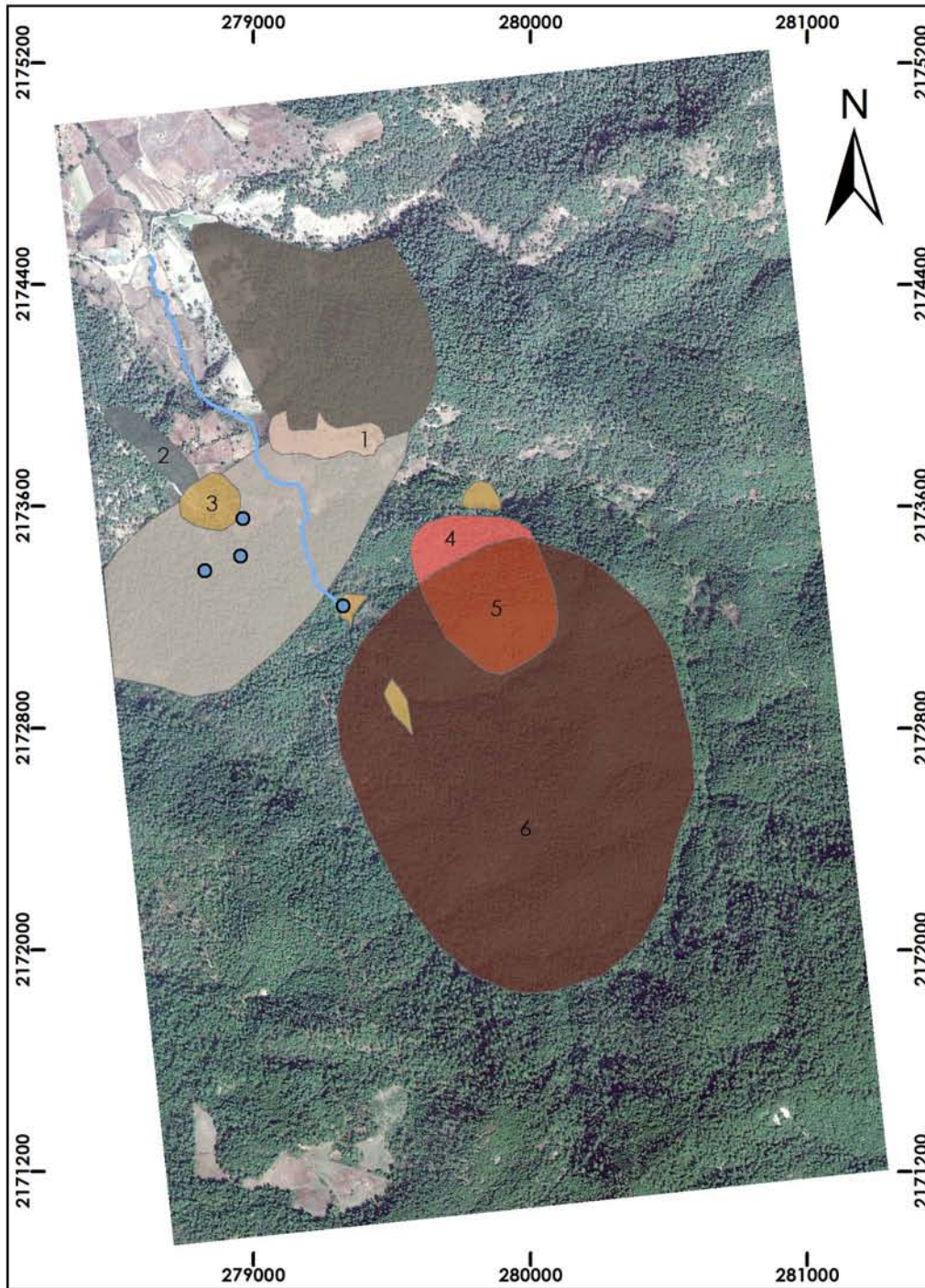
## Geographic reference

Google Earth Pro  
 Image 2015 DigitalGlobe

1:25,000



# Past Land Uses Identified by Women from Laurelito



## Notes

- 1 Livestock grazing has always existed.
- 2 No light, no water, no road, no transport, no school, no mill and less houses.
- 3 Crops and less essential services.
- 4 Fire 38 years ago.
- 5 Fire 38 years ago, more trees, more water, armadillos, rabbits, deers, possums, squirrels, mourning doves and chachalacas.
- 6 More trees, more water, armadillos, rabbits, deers, possums, squirrels, mourning doves and chachalacas.

## Spatial Reference

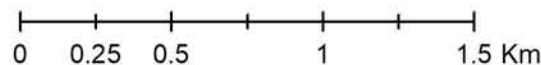
Projection: UTM  
 DATUM: WGS 84  
 Zone: 14N  
 04-29-2015

Author: Adrián Ortega Iturriaga  
 Participants: Women from the locality of Laurelito.

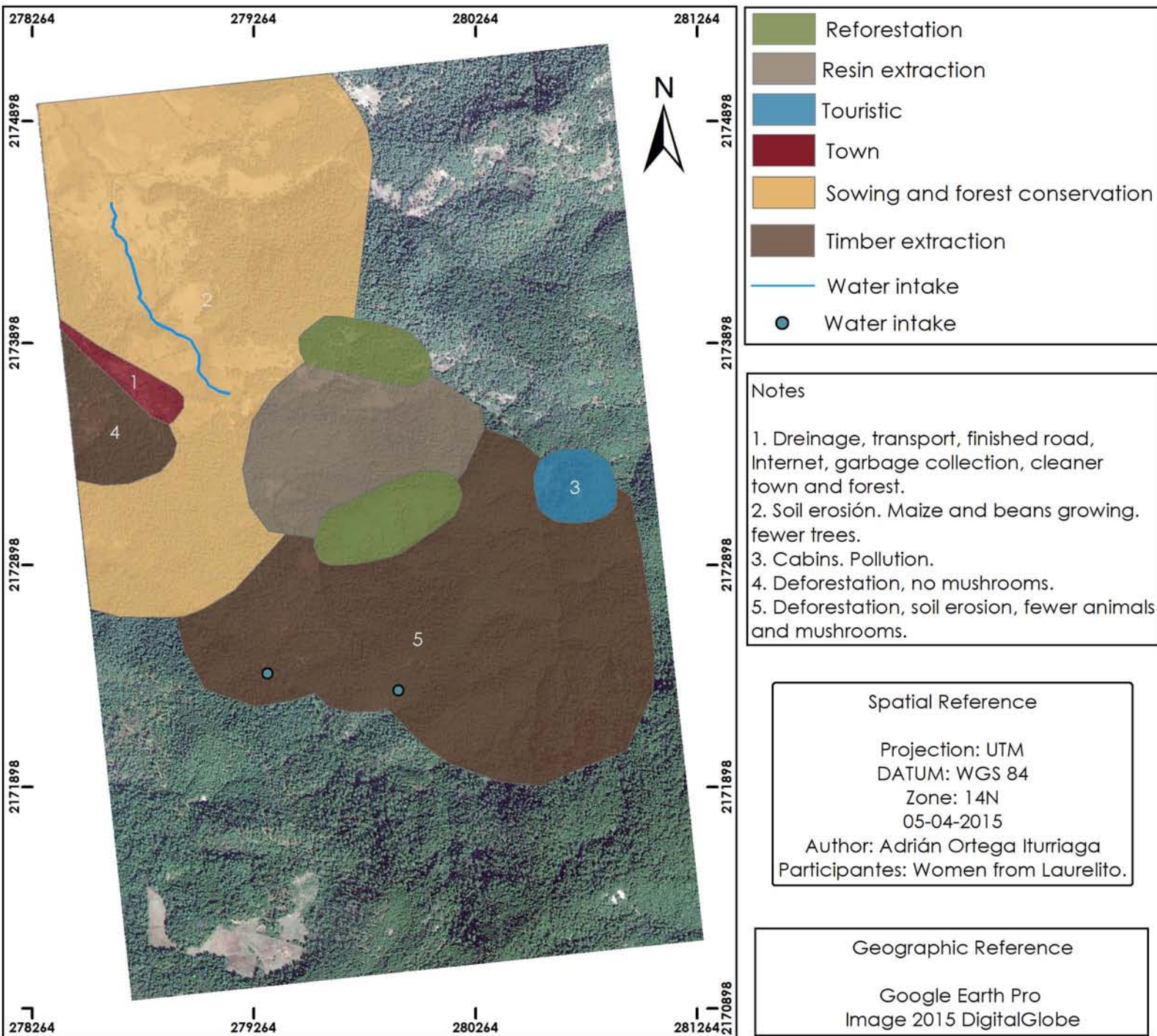
## Geographic Reference

Google Earth Pro  
 Image 2015 DigitalGlobe

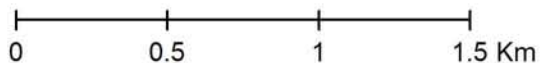
1:25,000



# Land Use Expectations Identified by Women from Laurelito

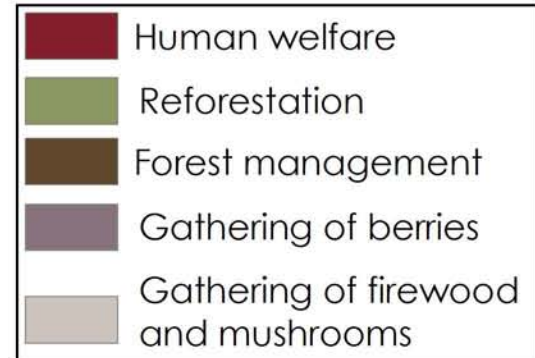
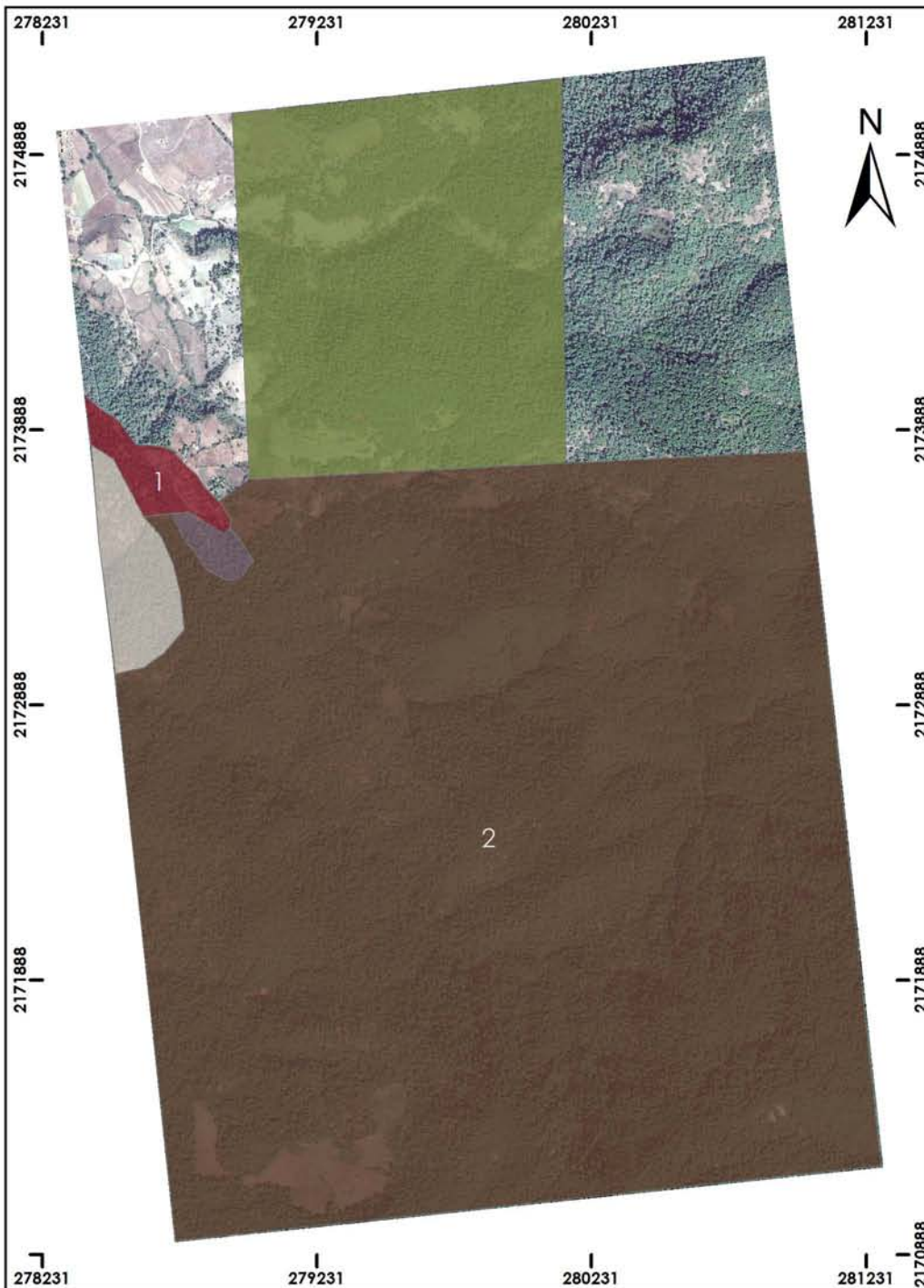


1:25,000





# Ideal Land Use Expectations Identified by Women from Laurelito



## Notes

- 1 Community improvement: Health care, park and gym, clean and productive land, domestic poultry, drainage, fruit trees, better teachers, highschool, finished road and internet.
- 2 Reforestation, more water, better organisation. If we keep having mushrooms, soil fertility and more forest animals.

## Spatial reference

Projection: UTM  
 DATUM: WGS 84  
 Zone: 14N  
 05-04-2015  
 Author: Adrián Ortega Iturriaga  
 Participants: Women from the locality of Laurelito.

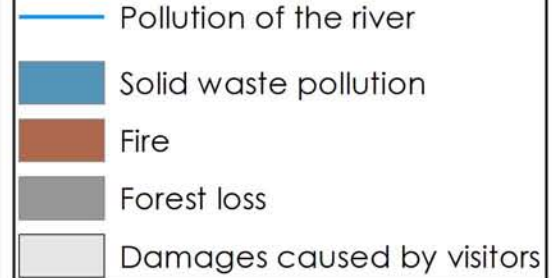
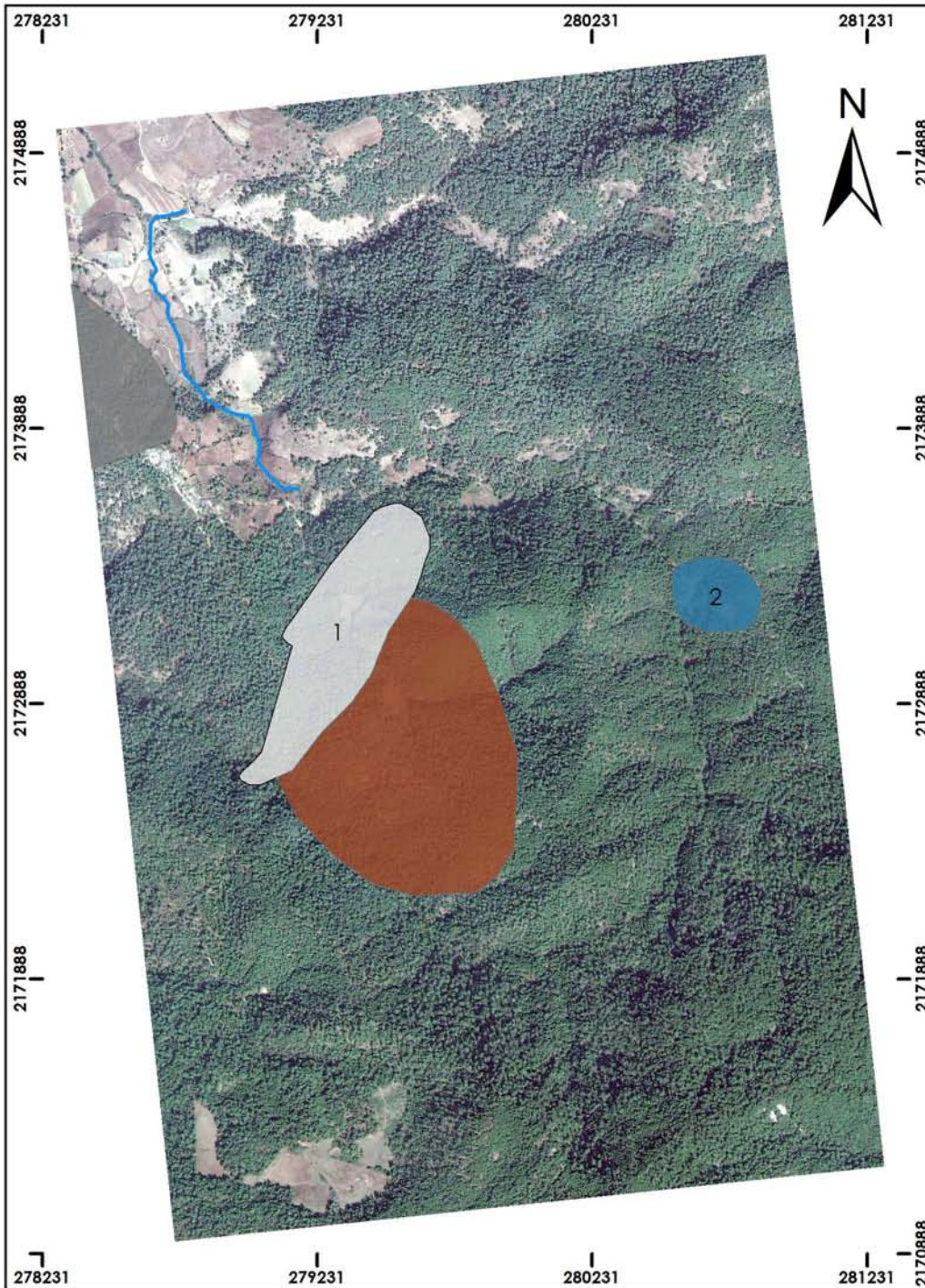
## Geographic reference

Google Earth Pro  
 Image 2015 DigitalGlobe

1:25,000



# Feared Land Use Expectations Identified by Women from Laurelito



## Notes

1. They do not want bikers to come anymore because they make noise and cause soil erosion. Also, they want people from outside the ejido to stop dumping garbage in their land.
2. They are hopeful about the touristic development, but they fear this could bring solid waste pollution.

## Spatial reference

Projection: UTM  
 DATUM: WGS 84  
 Zone: 14N  
 05-04-2015  
 Author: Adrián Ortega Iturriaga  
 Participants: Women from the locality of Laurelito.

## Geographic reference

Google Earth Pro  
 Image 2015 DigitalGlobe

1:25,000

