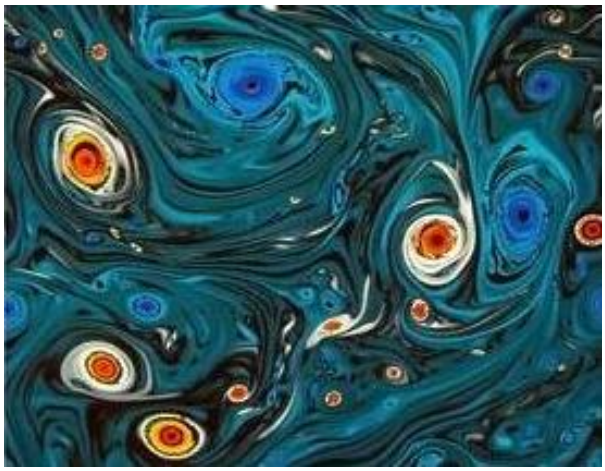
The creation of Fluidity

Actors and multities in assembling practices

The case of Agriculture in the Ecuadorian Highland



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The case of Agriculture in the Ecuadorian Highland

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Cover Photo:

"Snapshot of the vorticity field in two dimensional turbulence. Red and blue colours refer to positive and negative vorticity. A few well-defined coherent structures are observed." (Benzi and Frisch, 2010). Turbulences are non-systemic and unpredictable physical phenomena in liquids and gasses. The thesis will show that this fluidity can be found in agriculture.

Foreword

The interaction between humans and nature has been a long interest of mine. Coming to university I chose a social science program and added agricultural courses. I always experienced the field of agriculture as a direct correlation between humans and nature. It fascinates me to observe the complex interactions between them. I think, looking into this complexity will help me to work on the challenges the current world is facing.

For my Bachelor thesis I did a literature review on climate change adaptation of farmers in the Andes. I found a relation between adaptation and different rationalities of farming, also called farming styles. When I went to the field for the Master thesis my interest was to see if I find back my results on the ground. I got disappointed. Different to what I learned in the literature, categories of farmers and systemic relation hardly exist. Rather, I found complex relations between humans and their environment which do not fit groups of organic, conventional or traditional farmers. I realised that different to students surrounding me, I was rather interested in challenging theory of science than applying theory. The outcome was a highly inspiring process where I explored the emerging of overlapping realities. I worked hard to take the reader with me on this journey. I recommend taking tea and good music on this expedition.

Summary

Current agricultural situations in Ecuador are characterised by complexity, inconsistency and non-systemic practices. These fluid realities cause a fail of development interventions and form a fundamental challenge for current positivistic approaches in natural and social science. There is the need for an ontological turn in Theory of Science. This thesis asks: *How is fluidity created as practice between humans and nonhumans in agriculture of the Ecuadorian highland?* The question is answered by using theoretical insights from Integral Ontology and field data from agricultural situations in Ecuador. A combination of research methods from agronomy and ethnography was applied to gain data on the creation of fluidity. The thesis presents a framework which enables scientists to analyse fluid agricultural situations as assemblages between material and human actors. There are three main conclusions of the thesis. First, instead of one reality, there are multiple realities which overlap and cause fluidity. Second, instead of thinking about materialities as passive objects, they have to be considered actors in structuring realities. Third, instead of assuming a fixed world, realities are constantly becoming present; structures are in a constant process of emerging. These insights emphasis the need to work on a fundamental new approach in Theory of Science.

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Part I. Background

Agricultural situations in Ecuador demonstrate a current challenge for theory of science. Science is, and maybe always was confronted with a world which is in a fundamental process of change. There is change in what was assumed to be stable and solid. Today the solid world melts into fluid worlds. These fluid worlds mean that established conceptual categories are inadequate and that there is a gap between current theory in science and practices on the ground. The first part of this thesis will show what fluidity is and why it is a problem for current Theory of Science. This will lead to the research question and is followed by the discussion of conceptual tools to analyse case studies conducted on agriculture in Ecuador.

Chapter 1. Scientific challenges in facing a complex world

The first chapter intends to show what fluidity is and why it is a problem for current natural and social science. To do so, the evolution of development approaches, as example for (applied) scientific theory will be discussed.

Scientific theory and realities

The evolution of development approaches are an example of applied scientific theory. The approaches will be discussed with a focus on underlying scientific theory.

In the year 2000 the United Nations adopted the Millennium Declaration with the goal to eradicate poverty and to improve the living standards of people in development countries (Assembly, 2000). To reach these goals, for instance "transfers of technology" (Assembly, 2000:8) was put forward as method. This declaration is a popular example of how development interventions were conducted since World War II.

The speech by US president Harry S. Truman in 1949 is an example of early theory of development. Truman called for a transfer of technology, capital and modern knowledge to reach development. Transfer means that elements are taken out of their Western context and 'transplanted' into an 'underdeveloped' context (Umans and Arce, 2014). Underlying this practice was a theory of development as a lineal, structural path with fixed stages of modernisation. By transfers of technology, capital and modern knowledge modernisation could be reached (Rogers, 1962). Dualisms were created to separate the desirable from the undesirable. Common dualistic categories were for instance modern vs. traditional or formal vs. informal.

This approach was formulated in the modernity theory in the 1960s by for instance Rogers (1962). In this top-down approach external actors were transplanting measures neglecting the local context. The approach can be called *one-size-fits-all* because of the assumption of a linear cause-affect logic, introducing a measure means reaching development. It was assumed that the same measures would work at any place in the world like they did in the West (Umans and Arce, 2014). However, nowadays there are increasing numbers of scholars who recognised that 'underdeveloped' contexts are too diverse and complex to be solved by fixed measures. This causes failure of development interventions. In the 1980s first development scientists started to rethink development interventions (Booth, 1994). Instead of a linear application of the *one-size-fits-all* approach, there were notions of 'transformations' (Long, 1989) or 'translations' coming up (Buttel et al., 1990). This change from a theory of 'transplantation' to one of 'translation' meant that external techniques were tried to relate to local techniques. This was representing an approach of fitting an element into a context, also called *fit-in-context* (Umans and Arce, 2014). After the earlier development theory (Rogers, 1962), *fit-in-context* was part of systems thinking. In systems thinking, context was no longer an external but an essential part of a development interventions. The local, social or natural conditions had to be taken into account when a measure was introduced. In systems thinking, an object, also called entity, is in relation with its context. Together they form one unity, a totality. Removing one entity from a totality, affects the other and the whole. "Adding one part to the whole implied it had to fit into the whole" (Umans and Arce, 2014:338). This integrated approach was widely applied in different disciplines. It was for instance called 'integrated rural development approaches' in the social science and 'farming systems research' in the natural science. In fact, this theoretical approach is widely used in today's scientific world, while it has problematic limitations.

Increasingly, it is recognised that context is not only diverse or complex but rather blurred (Umans and Arce, 2014). Context can be called complex when it is unclear or unknown. It can be called blurred when it is no longer perceived to be singular but turns out to be multiple without clear boundaries. An example for a multiple reality is soil quality. Many authors have described a phenomenon where scientists and farmers have different ideas or realities of what makes a good soil (see for instance; Talawar and Rhoades (1998), WinklerPrins and Sandor (2003) or Crane and Traore (2005)). System thinking, build on a singular reality or definition of soil fails as realities are multiple and dynamic. Therefore, also practice is often observed to not follow systemic structures (Ong and Collier, 2005). Hence, agricultural situations are too dynamic and

non-linear to approach them by a static theory like systems thinking. Here, development approaches and applied theory commonly gets to an end. Nor the *one-size-fits-all* nor the *fit-in-context* approach can deal with these situations. Both, the early development theory by Rogers (1962) and systems thinking fail to offer functioning methods to approach realities in the intended way.

Thus, the evolution of development approaches shows a gap between what is happening on the ground and the available scientific approaches. To further clarify this problem some concepts will be introduced.

Fluidity as character of realities

It was shown that systemic thinking fails to relate to current realities. These realities can be called fluid. Zygmunt Bauman (2000) is known for his book *Liquid Modernity* where he uses the idea of *fluidity*. He took the concept from physics, where *fluidity* refers to the quality of liquids and gases. By its constant change and loss of durability fluidity distinguishes from solids. Bauman used the concept as metaphor to describe today`s modernity as being characterised by uncertain, constant changing and the end of big narratives like Marxism or Liberalism (Bauman, 2000). Authors like Deleuze and Guattari (2004) as well as Ingold (2009) use *fluidity* as more than a metaphor. They use it as way to describe realities. There is a constant dissolving of structures into multiple realities, multiples, which create *fluidity* (Umans and Arce, 2014). These multiple realities can be called *multities*. A multiple is constituted by overlapping parts of reality, also called wholes (DeLanda, 2006). The different realities about soil is an example discussed above. Here the reality of the soil might very different between farmers and scientists but also overlapping in some parts.

Fluidity
A dynamic character of realities with dissolving structures

Multities
Overlapping wholes which create multiple realities

There is a need for a fundamental different approach in science to understand multiple realities and fluidity. Therefore, in the following some philosophical thoughts will be discussed.

Integral ontology as alternative approach to realities

Philosophy uses the term *ontology* to describe different approaches to the nature of realities, to what is considered to exist (Roe 2009). The discussion about ontology started in the time of Isaac Newton. Since that time, disciplines like biology, psychology and social sciences emerged and brought increasing complexity into the field. Newton's relatively simple theory,

called natural philosophy, became too limited to explain the realities of these new fields of thought. A discussion about the nature of realities began. However, Einstein's quantum theory and Heisenberg's indeterminacy principle showed the infeasibility of science to reach a stage of certainty about what reality is. This comes due to the conclusion that realities are created by the tools scientists use and thus does not exist 'out there'. By this, the authors questioned the existence of one reality and showed that reality depends on the way of approaching it (Bennett 2009). The existence of different ontologies becomes clearer by the following discussing on three ontologies which are used in today's science. This will also show limitations of current dominant ontology in science to approach fluidity.

Ontology
Philosophical study of being, existence and reality

Esbjörn-Hargens (2010) discussed three ontologies by asking; what is an empty soda bottle? His example is interesting in the context of the thesis as it questions the dominant scientific discourse of Modern Ontology and reasons why an Integral Ontology is used in this thesis. Figure 1. will be referred to in describing the three ontological approaches; Modern Ontology (a.), Postmodern Ontology (b.) and Integral Ontology (c.).

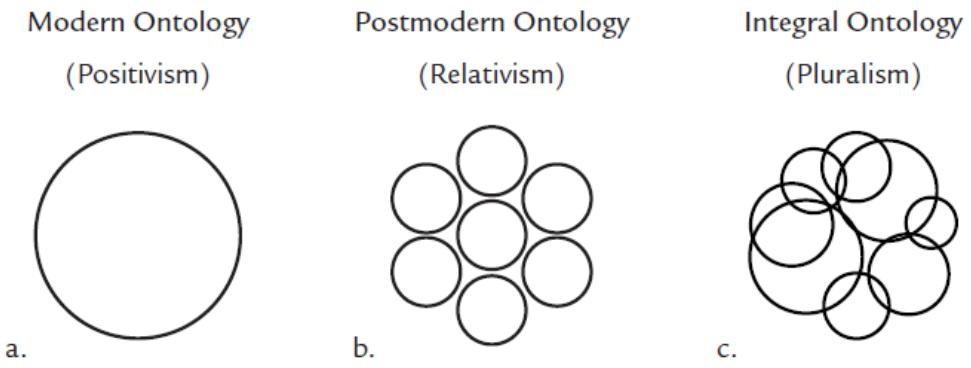

Figure 1 Ontological positions (Esbjörn-Hargens, 2010)

According to positivism a soda bottle is considered to have one independent and pre-given reality (Esbjörn-Hargens, 2010). Positivism (a.) as part of Modern Ontology has a singular approach on reality. It assumes one pure reality which can be discovered by methods of the natural science (Parr 2010). In Fig 1 it is therefore represented as one circle. It is an approach popular in science until today. By reducing knowledge to the observable, the approach claims that there are universal laws which apply to all spaces and times (Oliga, 1988). These assumptions are strong in the one-size-fits-all approach, described in the first column of this paragraph. Here, it was assumed that an intervention like a technology has the same reality in a western and in a developing country. It was assumed that it would work independent from the

space and time. As it turned out that this does not work, the fit-in-context approach proposed solutions related to local contexts. However, also here positivism is the dominant discourse. In systems thinking for instance, the elements within the systems are analysed assuming one universal reality. The focus is on quantifiable aspects like physical, biological or economics aspects of a problem which need to be quantifiable. Based on these aspects, there is an external intervention where the farmer has a passive role to participate and collaborate (Ison et al., 1997). In the context of fluidity, positivism is shown to be inadequate to relate to situations on the ground.

An alternative is relativism (b.) as part of the Postmodern Ontology. Coming back to the example of the soda bottle, the approach argues that the bottle is individually constructed. This means that its reality is defined by the personal social experiences of the person experiencing the bottle (Greenhough, 2009). In Figure 1. realities are therefore visualised by many independent circles. Thinking the approach further means that every materiality is considered as not real and only exists as personal illusion. For instance, environmental pollution would be socially constructed. It would exist only as construction of individuals, general concerns about pollution would be baseless. Critiques claim that this view does not help to find solutions to problems humans are facing (Castree and Noel, 2001). More important might be that the approach cannot explain why different people have a shared idea of a materiality. In fact there is apparently something constant which humans enable to notions of a shared reality.

The third approach is called pluralism and is part of the Integral Ontology (c.). It argues that there is a continuing element of the soda bottle. It enables humans to agree on what a bottle is. At the same time different constructions of the reality of the empty bottle which can turn it from a source for deposit to a vase in a modern art gallery or a weapon against the police. Thus, there are multiple constructions of reality but also some continuity. It means, that more than one bottle is possible (Smith et al., 2002). The bottle is turned from a singular reality to a multiple one with overlapping constructions. It is indicated by overlapping circles in Figure 1 (Esbjörn-Hargens, 2010). This means an Integral Ontology helps to understand the meaning of multities which makes it highly interesting in the context of this thesis. However, it means a fundamental challenge, for scientific research approaches. It is not enough to study the social construction of a reality, like popular in the social science. At the same time it is not enough to study the continuing elements of materialities, like popular in the natural science. The

Integral Ontology
Philosophical understanding of reality as multiple and overlapping

fundamental question here is if the classical distinction of the natural (science) and the social (science) are adequate in describing the elements of an Integral Ontology.

There is a strict distinction between objects and humans between nature and society. Thought, today's world makes it hard to distinguish between the social and the natural. A GMO plant is hard to put in a natural or a social category, because it is an object from nature manipulated by humans. This gets also obvious when thinking about petri-meat made in a lab. Is it a natural or social construction (Roe 2009)? Besides these relatively obvious examples, an Integral Ontology argues that realities do not exist within the dualism of natural and social, but is also a construction by both elements. This has fundamental implications for power relations. The natural or material is often assumed to be passive while humans are considered to give structures. Being based on Enlightenment thinking, this dualism is called the difference between the human subject and the material object (Bryant, 2011). The Integral Ontology however, assumes "no taken for granted horizontal or vertical hierarchies" (Jóhannesson and Bærenholdt, 2009:17) between the social and the material. Here, humans are not seen as centres of being, not as subject but as object among many others (Bryant, 2011). A basic example, when driving a car, traffic lights and road markings govern our driving behaviour, advertisement our buying behaviour and Wi-Fi in buses our communication behaviour. This means that both, the social and material have the capacity to act. The term to describe this capacity is *agency* (Jones, 2009).

The blurred dualism of natural and social and the flat power relations between materialities and humans show that current concepts are inadequate to describe these phenomena which are part of an Integral Ontology. To understand fluidity, different concepts are needed which could be called *human* and *nonhuman*. Roe (2009) describes nonhumans as everything which is 'not human'. This ranges from plants and cows to soils or self-creating processes like a heavy rain event. The fundamental different to the classical concept of natural is that nonhumans are considered to be actors in the Integral ontology.

Nonhumans
Actors performing a material role

Humans
Actors performing a constructing role

Linking back to the challenge of science in facing a complex world, this means that to understand the creation of fluidity, there is a need to understand how human and nonhuman actors construct realities. This opens the space to understand the creation of multities and explains the title of the thesis: "The creation of Fluidity: Actors and multities in assembling practices".

Chapter 2. Research agenda and analyse concepts

After formulating the research agenda for this thesis, concepts will be operationalised which will be used for the analysis of the cases. The research agenda consists of the problem statement, the research objectives which and the research question.

Research agenda

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Problem statement

The problem statement is based on the scientific challenges in facing a complex world, the previous chapter. The chapter showed a gap between scientific theory and fluid realities on the ground. Fluid realities are characterised by dissolving structures and multiple realties. An example of a problem from applied science is the fail of recent development interventions related to the fit-in-context approach. This means a **practical problem** for applied science. There is the need for a new approach to influence realities in an intended way. At the same time there is a **theoretical problem** for science, fluid situations bring fundamental challenges for basic assumptions of the natural and social science. It asks for a contribution from the classical social science, making sense of heterogeneous constructions of realities. It asks for a contribution from the classical natural science, to make sense of continuing elements of materialities. A certain reality cannot be understood on a material level or on the level of human way of constructing it. An Integral Ontology shows the need to understand both levels. At the same time, it fundamentally challenges assumptions in both disciplines. There is the need to overcome divisions of 'the natural' and 'the social'. At the same time it questions subject vs. object divisions, it puts forward agency of both humans and nonhumans. These theoretical ideas and were not (yet) translated into analytical concepts. Nor was discussed how a research beyond natural and social science or subject and object division could look like. This forms a **methodological problem** of how to investigate fluid realities.

By analysing case studies conducted on agricultural situations in Ecuador, the three problems will be addressed, asking the question; *How is fluidity created as practice between humans and nonhumans in agriculture of the Ecuadorian highland?*

Research objectives and scope

The research objectives relate to the problem statement by contributing on three levels, practical, theoretical and methodological.

On a **practical level** the thesis intends to contribute to a new approach in development cooperation which goes beyond the *fit-into context* approach. The approach needs to integrate the insights from an Integral Ontology. By this, the practical objective is strongly related to the theoretical one. On a **theoretical level**, it will be contributed to the field of Theory of Science. By choosing for an Integral Ontology, the thesis contributes to a field of science called the *ontological turn* in rural studies. For instance Brives (2013) described this field as one with multiple objects in multiple worlds. The Integral Ontology is used to better understand fluidity, with a focus on agriculture. It intends to overcome the disciplinary division of the natural and social science. It will put forward the relevance of both, human and the nonhuman actors to understand multities which cause fluidity. A framework will be developed to better understand the relations between the two actors. This links to the contribution on the **methodology level**. The thesis intends to integrate research methods from the classical natural and social science fields to understand human and nonhuman actors. It will show that by starting from the material level, social scientists can develop a better understanding on how humans construct practices, acknowledging nonhuman agency.

Concerning the scope of the study, the research is based on a three month field work in the Ecuadorian highland. It was stated earlier that agriculture forms an excellent field of studying fluidity. It would have been possible to study fluidity in cities, in modern art or in the way international financial markets operate. However, agriculture is a field where there is a direct interaction between the human and the nonhuman field and therefore interactions can be observed easily. At the same time it is a field where disciplinary boundaries between social and natural science are very strict which make the limitations of both visible. Coming back to the scope of the study, this means that there are limitations related to the choice for agriculture. The logics of fluidity might be different in agriculture than in cities. At the same time it was chosen for agriculture in Ecuador. It will be shown that agricultural practices in Ecuador are highly diverse which offers different cases and the possibility to compare. However, the insights of the thesis might be limited to agriculture in this region. The focus was on following humans and nonhumans starting from the martial plot level. More time would have offered more in-depth understanding of these relations. Next to the field work, most time was invested in studying

ontological theories. Because of the limited time for this thesis, wide-ranging literature on Actor-Network Theory, Technology Studies and highly interesting philosophies of Manuel De Landa and Gilles Deleuze could only partially be included. Finally, a choice was made to analyse only two of the three case studies to find a balance between in-depth analysis and scope.

Research Question

Based on the problem statement and research objective, the following main research question will be answered drawing on a number of sub-research questions.

How is fluidity created as practice between humans and nonhumans in agriculture of the Ecuadorian highland?

1. What are characteristics of agricultural plots?

2. How do humans and nonhumans construct practice by assembling?
2.1 How to characterise fragments of the plot?
2.2 How do relations of power construct assemblages?
2.3 How are different assemblages performed in the plot?

3. How does practice create fluidity?

The problem statement argued that there is a need for a better understanding of; *How is fluidity created as practice between humans and nonhumans?* This question will be approached by focusing on agriculture of the Ecuadorian highland which leads to the main research question. The motivation for a focus on agriculture in Ecuador will be discussed later in this text.

Concerning the sub-research questions, the first question is; *what are characteristics of agricultural plots?* The question is intended to discuss fluid realities in the plot. By this it forms the basis for the second sub-research question; *How do humans and nonhumans construct practice by assembling?* This question intends to explain how these multiple are created between humans and nonhumans. After discussing human and nonhuman fragments (2.1), relations of power between the actors will be analysed (2.2), ended with an evaluation of how performance takes place (2.3). This will raise the last sub-research question of; *How does practice create fluidity?* Here, it is evaluated if the analysis of practice enables a better understanding of fluidity.

Theory, analysis and discussions

The thesis consists of nine chapters, within three main parts. In the theoretical Part I (Chap. 1 to 3), it will be presented what the field data intends to present and how it was gathered. Chapter 1 presents an introduction to the research problem and the aim of the thesis. This includes a critical review on approaches in development cooperation and linked ontological theories. Combining these insights, the chapter identifies the gap between current theory and practice in dealing with fluid situations on the ground. In the background chapter 2, the concepts to analyse fluidity will be developed. Chapter 3 deals with methodology and research design. Theoretical and practical instruments of data collection, presentation and analysis will be described.

In the data and analytical Part II (Chapter 4 to 7), the data and its analysis will be presented. Chapter 4 describes the data of two case studies conducted during the field work. Chapter 5. analysis what characteristics of agricultural plots in the case studies. It focuses on the fluid phenomena. Chapter 6. will analyse how practice is constructed by assembling between humans and nonhumans, this is the main analytical chapter. Chapter 7. will discuss if the Integral Ontology can help to understand the fluid situations found in the plots.

The discussion Part III (Chapter 8 to 9) contains the discussion, definition of a future research agenda and reflection. In Chapter 8 key findings are discussed and linked back to the research problem. These insights will be used to formulate a future research agenda. Chapter 9 will reflect on the research process.

Analytical concepts

Having set the research agenda for the thesis, in the following the analysis is prepared. In chapter one, concepts were used to clarify the research problem. In the following these concepts will be further developed into analytical ones to understand; *How is fluidity created as practice between humans and nonhumans in agriculture of the Ecuadorian highland?*

Characteristics of agricultural plots

The goal of the first research question is to identify fluidity in agricultural plots. The way to access the topic is by materialities. By carful observations, they can be identified to emerge in multiple realities. According to Umans and Arce (2014), this is an important process in the creation of fluidity, it is called *intermingling*. In the example of the bottle this refers to the fusion of identities of the empty soda bottle being an object of art or a weapon against the police at the same time. Thus, the nonhuman is part of two human constructions at the same time. On the ground this means a lack of clarity about what a materiality is.

Intermingling
Feature of fluidity where a materiality can be part of multiple realities

The concept of intermingling will be used to analyse the materialities of the focus plots in the case studies. The actors and relationships engaged in the plots will be addressed in the following.

Actors and Process in the construct of practices

The Integral Ontology showed the need to look into human and nonhuman actors to understand the composition of multities. The insights are needed in the analysis of research question two; *How do humans and nonhumans construct practice by assembling?* This was identified as main focus of the thesis. To start, it will be focused on fragments in multities, called assemblages

Fragments of multities

In chapter one, the relationship between humans and nonhumans was identified as process in constituting multities. According to Arturo Escobar (2006) one of the most important ways to analyse such relations is the ‘assemblage philosophy’. The meaning an assemblage can be illustrated by the example of an archaeological dig. Various artefacts like a bowl or figurines are collected. Together they are a collection of things without meaning. The meaning becomes clear

by looking into the relations of the artefacts. By understanding the relations, it can be understood what they can perform, for instance what is known as Etruscan culture (Marcus and Saka, 2006). Thus, assemblages can be defined as "wholes whose properties emerge from the interactions between parts" (DeLanda, 2006:454). This makes assemblage a fragment of a multiple reality, many (overlapping) assemblages make a multity.

Assemblage
A fragment of a multiple reality formed by entities and territories

The origin of this philosophy is in architecture, art and literature of the 19th century. Via 20th-century avant-gardes it found its way into social theory (Marcus and Saka, 2006). Here, the concept is often used by authors from Actor Network Theory (ACT) who are influenced by the debates within Science and Technology Studies (STS). In the 1980s, authors like Michel Callon and Bruno Latour were claiming that technical change cannot be purely socially constructed (Marcus and Saka, 2006). Instead, there is a need "to turn our exclusive attention away from humans and look also at nonhumans." (Latour, 1992:153). This emphasises the role of nonhumans in the construction of realities, like discussed in the previous chapter.

Assemblages have a second function, next to the role of making sense of static arrangements, like in the archaeological dig. The second focus is on the act of assembling. This process is one of "bringing disparate elements together" (Umans and Arce, 2014:338). Like discussed above, this practice is not central governed, nor by humans or by nonhumans but by both actors (Bennett, 2005). This part of the definition is referring better to the actual meaning of the term assemblage. It is a translation of the French word *agenecement* which is not a static arrangement but about a process of arranging. It is not a set of parts which are put together but rather a process of becoming which is bringing them together (Stivale, 2005).

The two elements which come together in assemblages are the humans and nonhumans. (Deleuze and Guattari, 1988). These two actors will be discussed in the following paragraphs.

Space claimed by nonhumans

According to DeLanda (2006), entities are "components of the assemblage playing a material role" (DeLanda, 2006:73). In the context of the agricultural plot, this can be the soil, manure or rain. These nonhumans play a role and have a certain identity. Identity in this context is defined as "set of characteristics by which a person or thing is definitively known"

Entity
Material space claimed by nonhumans

(McDowell, 2009:59). The thesis follows a post-structural approach which argues that identities are multiple, fluid and unstable (Johnston, 2009).

Entities are characterised by two process, internality and con-fusion. Internality means that the identity of an entity refers to a previous identity; there is certain stickiness to the past. So an entity always takes "memories, embodiments, experience" (Umans and Arce, 2014: 338) with it. In the example with the empty soda bottle, the bottle can only be part of the modern art exhibition because of its previous identity. Being an old Coca Cola bottle brings a notion of American Dream and Modernity which makes the bottle an art object.

Internality
Current identity of entity is related to the past

The concept is linked to a process of so called *con-fusion*, the second process in entities. Con-fusion is fusion and con-fusion in one (Umans and Arce, 2014). This means an entity is removed, decontextualised, from its context and reassembled in a new one (recontextualised) (DeLanda, 2006). Because of the stickiness in internality, this process is often incomplete. This produces entities which are stuck between two. By this, a person might confuse the empty sod bottle from a modern art exhibition with a weapon against the police and take it to the street and by this destroy the art work in a political performance against the 'law enforcement agency'.

Con-fusion
Incomplete transfer of an entity to a new context

Entities in fact do never exist as pure component but are always linked to a certain territory. Entities are always artefacts used to perform or express a territory (Stivale, 2005). These territories will be discussed in the following.

Space claimed by humans

The meaning of the concept of territory can be illustrated by an example. Deleuze and Guattari (1988) use the case of a child being afraid in the dark. By singing some tunes, the child constructs a space of comfort and home. Home is a territory here which claims a human space. Other examples are entities like a seat in an airplane or a towel at the beach which can perform the same territory, a space of comfort. However, these territories are more than occupying a space but also a stake, "my home". These kinds of examples need to be addressed in the analysis of the cases. Other authors use the concept of territories to describe the space an assemblage can claim (Stivale, 2005). For the stake of this thesis, it will define the space the human expression claims in an assemblage. Figure 2 shows a dance performance. Contemporary dance performances are an

Territory
Constructing space claimed by humans

Figure 2 Becoming stable!? (Schatz 2007)

example of very dynamic territories which are created by arrangements of rhythm and space. A problem, also with dynamic photos is however that it can hardly express these processes of becoming because of being fixed a snapshot. However, the human mind is able to see beyond the bodies as entities and see the abstract territory created at a certain moment.

The example of singing shows that a territory exists only in the moment of creating. Therefore, territories are not fixed but "always being made and unmade" (Stivale, 2005:79). This process is what can be called *becoming*: "This is a world that cannot just be, but that is brought forever into being" (Adey, 2009:194). This process of becoming is why assemblages should rather be seen as process of assembling, like introduced above. In becoming, there is a constant process stabilisation, *territorialisation* and destabilisation, *deterritorialisation* (Delanda, 2006). Coming back to the notion of home, the personal perception what is home might be very different during different stages in life, for a baby home is different than for a teenager or adult. So the notion of home was territorialised at a certain life-stage, but changed while growing up. It might have change from home as the arms of the parent to home as the place were friends live. This is an example of how the data analysis could work with the concept of becoming.

Becoming
Process in which a territory is coming into existence

Territories are more abstract spaces, compared to material entities. Therefore, for the analysis visualisation can help to make territories visible in the mind of the reader. In their book *A Thousand Plateaus,* Deleuze and Guattari (1988) were developing several new concepts with the goal to describe things rather as a process of constant connecting, instead as how or what they appear to be. One of the concepts is called "lines of flight" (Deleuze and Guattari 1988:3). It is a path where a body is created by the constant process of connection which unfolds the capacity of this body to act. Inspired by this idea of lines, territories can be constructed by three lines which form a body in a triangle (see example in Figure 3). The lines are dotted to indicate the temporality of this process and its state in a constant process of becoming. Three significant keywords from the field data will be used to sketch each of these triangles. For instance, the territory of indigenous, as experienced in Basquitay, will be presented by the three keywords of

to liberate, to demand and to sustain. The three keywords together create field of tension which shows how humans construction articulates in realities. Like entities in an assemblage can never exist without territories, territories can never exist without entities. The relation between the two actors will be discussed by focusing on power in the next paragraph.

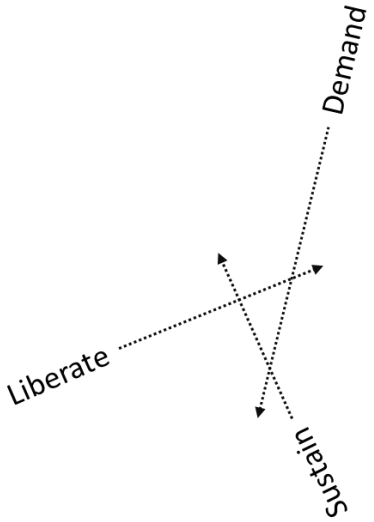


Figure 3 Example of a territory sketched by three keywords which form a triangle

Power in entities and territories

Having discussed entities and territories as components of assemblages, further insights are needed to understand how the actors actually create assemblages. It was indicated that both of these actors have power. Power can be defined as "capacity of controlling influence to do something in a specified way" (Sarma, 2009:79). The post-structural theory adds that power is a dynamic process which "circulates unevenly between people and places, creating material and symbolic effects" (Thien, 2009:71). This links to the discussion about agency from earlier in the text. Agency was classically defined as capacity to act (Jones, 2009), so the power to influence a reality. Looking into human and nonhuman actors, both have power to influence each other. This process will be described as mobilisation. This process can go both ways, an entity can mobilise a territory and vice versa. This power will be called capacity to mobilise, *mobilisation*. This kind of agency is considered to be less strong agency compared to the kind of agency which is widely attributed to humans (Bennett, 2005). Thus, in the analysis of the data, it will be focused on how entities and territories related to understand the different processes of mobilisation.

Mobilisation
The ability of an entity to relate to a territory or vice versa

Performance of assembling

Independent from who has the power in assembling, assemblages only takes place when a function emerges (Parr, 2010). This was earlier discussed when taking the example of the archaeological dig. This takes place when humans and nonhumans "collectively perform a role" (Roe, 2009:1). *Performance* is part of Goffman's famous symbolic interaction theory. He presented an approach where practice is a performance of a certain role. This means that a person performs a different identity when being at work, compared to being with the family (Goffman, 1959). The idea of agriculture as performance was introduced for instance by Richards (1989). A commonly used metaphor for performance is a human driving a car. Here, the human and the nonhuman are working collectively, as an assemblage. Humans and nonhumans constitute each other and collectively perform a role (Roe, 2009). Especially in the case of cars the performance goes beyond the function of moving locality to one of performing for instance wealth. However, this can be more complex, as situations in the field might rather appear like in the photo. Figure 4 shows a man and woman leaning back and balancing each other via the materiality of the bow. The persons and the bow come together in an assemblage. The assemblage performs the tensed bow for a certain function which appears to be hidden in the first place. So there are different question here, the first could be; what can this assemblage do? Is the man killing the woman? Is it about trust? About love? So the next question could be; what are the entities and territories engaged? How is the assemblage in becoming, so what is next? What if the woman lets go the bow? What power has the bow? How does the situation change by the observer watching the performance? The main interest in showing this phot is that it offers a view on performance as non-linear. The viewer has only limited ideas about what is happening. This takes the research beyond what he assumes to be obvious. By this the space is opened to the underlying processes. This is

Figure 4 Marina Abramovic, Rest Energy with Ulay, 1980 in Sean (2010)

Performance
The collective acting of entities and territories

an example of how the data analysis could work with the concept. The limitations of a picture are that it can only give a snapshot of a process of assembling in the past. The dynamics remain unclear.

Critiques to assemblage philosophy

Having discussed entities and territories in assemblages, there are authors who claim that there is some inconsistency in the concept of assemblage. Marcus and Saka (2006) argue that assemblage thinking, like used by Deleuze and Guatarri, mediates between two lines of though. The first is the aesthetic of art with it is intractably unpredictability of dynamics of the contemporary world. The second line is one of structure and Math which hopes to grasp the order and disorder of today's processes. So the concept wants to both, to understand the non-linearity of social process and at the same time it tries to keep its commitment to the systematic in social life. The authors recognise a tension in this approach of trying to integrate fluidity and structure in one concept (Marcus and Saka, 2006).

These comments can be considered a critique. However, both elements, the dynamic and the structure seem to be part of realities surrounding us. The tension in the concept might therefore be a good representation of what is happening on the ground. Moreover, the concept offers space for integration of humans and nonhumans on an equal level. This makes it highly interesting in understanding fluid realities on the ground.

Chapter 3. Agricultural Context and research techniques

Having introduced the analytical concepts, this chapter will give a practical context to the research area, the Ecuadorian highland. Furthermore, it will discuss the research techniques.

History of Ecuador

Human life in Ecuador dates back about 3000 to 2500 BCE. Archaeological finds of pottery from this time indicate a cultural influence from Central America. Taking a big step to younger history, by the 1400s, the area of today's Ecuador was divided into warring chiefdoms. During this time sophisticated agricultural techniques like raised-fields were used in agriculture. Trade networks connected the highland with the western cost and the eastern lowland. The Incas conquered the highland area around 1463. They introduced Quechwa as common language and resettled local people who were resisted against the new culture. In 1532 the Spanish arrived in Ecuador and started a war against the Inca Empire which capitulated one year later. During the colonial time Ecuador remained a peaceful colony with flourishing agriculture. From 1809 a partisan group attempted to liberate the country, it took until 1820 before independence from Spain was declared. Stepping to the 20th century, until the 1970s Ecuador's single most important export product was banana. After oil was found the economy of the country relied on this new export good. As response to an economic crisis, in the year 2000 the US dollar was introduced in Ecuador. In 2008 a referendum was hold which gave important rights to the indigenous population (Lauderbaugh, 2012).

In today's Ecuadorian society, there is a social distance between the indigenous farmers in the mountains and the people living in the city. People in the city often have mixed Indigenous-European origin (Mestizo) and make about 70 percent of the population. They normally speak Spanish and cannot speak the indigenous Kichwa language. Indigenous people make about seven percent of the Ecuadorian population, the remaining 23 percent constitute by Montubios, Afroecuadorian and White people (Becker, 2010). The different names of the groups are sometimes considered racist. Indeed, there is racism and people in the city often talk about indigenous people as "primos" (Spanish for cousin) which is a pejorative way of referring to them. Those people consider indigenous as dirty, poor and non-modern. On the other side, indigenous people often are proud of their language, culture and striving for an independent way of life. Between indigenous people and people from the cities, there is often no contact and both

social spheres stay separated. However, connecting points are NGOs working in the community and farmers markets where Mestizos buy goods from indigenous farmers.

Agricultural in Ecuador

Environmental conditions in the Andeans are characterised by a wide heterogeneity of soil, vegetation and climate. As these conditions form the bases for agriculture, farming practices reflect this heterogeneity. An example is that farmers use different latitudinal zones by having fields at different heights in the mountains to make use of different climate conditions. Mainly small-scale farmers can be found which use modern and more traditional varieties of crops and livestock. Crops in the region include potato, maize, quinoa and barley and vegetables like beans, carrots and onions are cultivated. Livestock like alpaca, cattle and pigs for most smallholders is a critical asset on their farms. Mixed crop-livestock farms can mostly be found in areas below 3800m. Above this altitude, risks for crop production due to frost increases and therefore, livestock becomes more important. Going down in altitude, more industrial intensively managed fields can be found (Fonte et al., 2012). Different techniques are used to plant crops, including for instance terraces or raised beds or so called waru waru systems, which are systems to irrigate and at the same time ensure drainage, which prevents plots from erosion (Fonte et al., 2012).

Modernity is present in the Andes, it is adapted but not in a linear way. Concepts like mutants and hybrids can be used to describe how modernity is reassembled from below. Farming practices are oft a mixture of so called modern and local practices. An example is the mix of modern planting distance with traditional varieties of potatoes. These forms go beyond notions of traditional or modern, beyond local and global or right and wrong as proposed by the agenda of modernity, modernity here is challenged from below (Arce and Long, 2000).

Environmental change

While it remains difficult to define what the abstract notion of climate change can mean on the ground, there is some environmental change experience by farmer. According to farmers, the rainy season became unpredictable, while it was more stable in former times, it now sometimes begins in November, instead of September. At the same time, if it rains, the events are shorter and more intense which increases the danger of erosion (McDowell et al., 2010). Absence of snow and higher temperatures contribute to melting of glaciers which are a source of fresh water (Young and Lipton, 2006). Biodiversity declines with negative influences on agriculture, as

useful species might disappear (Urrutia and Vuille, 2009). On the other side, species like malaria mosquitos and harmful species for agriculture immigrate (Boko et al., 2007). People in the region report more hail storms (Viscarra and Malmqvist, 2011) and frosts destroying their fields (Foster, 2001). Climate variability is likely to aggravate greatly the degradation of soils in Ecuador (Sherwood and Bentley, 2009).

Research techniques

Sampling

Three cases studies were conducted to research how fluidity is created between humans and nonhumans, of which two were analysed in the thesis. It was chosen for agriculture in the highland of Ecuador. Earlier it was motivated why agriculture is an interesting field to study when working on Theory of Science. It was chosen for Ecuador as cases study side as farming practices in Ecuador are highly diverse. This offers the possibility to compare different constructions of practices and realities. The three case study sites where chosen with the goal represent different human and nonhuman settings. The first site chosen is a commercial farm in the community of Yanahurko, high in the mountains which is associated with cold climate. The second site is a subsistent farm in the community cold and wet. Basquitay which is medium high in the mountains and has a less cold and more dry climate compared to the first. Finally, the last community is a commercial farm in the lower mountain area which has very dry and warm climate. This gives only a few indications of the differences between the case study sites. The sites were chosen together with the NGO EkoRural. The NGO works on sustainability in agriculture and supported the research by contacts to farmers. This offered access to remote communities and at the same time determined the chosen sites. The farmers of the family were not working for the NGO. However, in the community of Basquitay the woman was the farmer and her husband worked for EkoRural. This implies a certain relation of the farming practice of this family to the agricultural agenda of the NGO. This however is considered to have low influence on the research. For the research it was not important to learn about a specific farming technique but to work on theory about human and nonhuman relations. This interaction was found independently in the different agricultural logics, in the commercial like in the subsistent logic for instance.

Having chosen the families, in each family one plot was chosen for the research, in the following these plots will be referred to as *focus plot*. A plot is a "piece of cultivated land containing a single crop or single homogeneous mixture of crops" (Casley and Kumar, 1988: 62). The boundaries between plots are the crops, not necessarily a physical boundary. The way of choosing these plots was done after a first evaluation of the general way of farming and after knowing the different plots of the families. The goal was to select plots which are representative for the families by its way of communication between humans and nonhumans. Criteria were for instance that the plants growing on the plot are representative for the family but also in the community. Furthermore, the plots needed to be part of the family farm since more than ten years. This is due to the fact that management practices can then be found back in the behaviour of the soil, for instance by soil colour which is an important criterion of soil quality for farmers. As part of this choosing process, maps were made including plot sizes, plants, landscape elements, houses etc.. The maps were drawn on A2 papers. This has practical limitations for presenting them in this thesis, Figure 5 gives an example of the map of Basquitay, the focus plot is indicated by a red arrow. All the maps can be found in the appendix.

As indicated earlier, this thesis contains an in-depth analyse of two of the three cases. The case chosen are the commercial farm in Yanahurko and the subsistent farm in Basquitay. They were

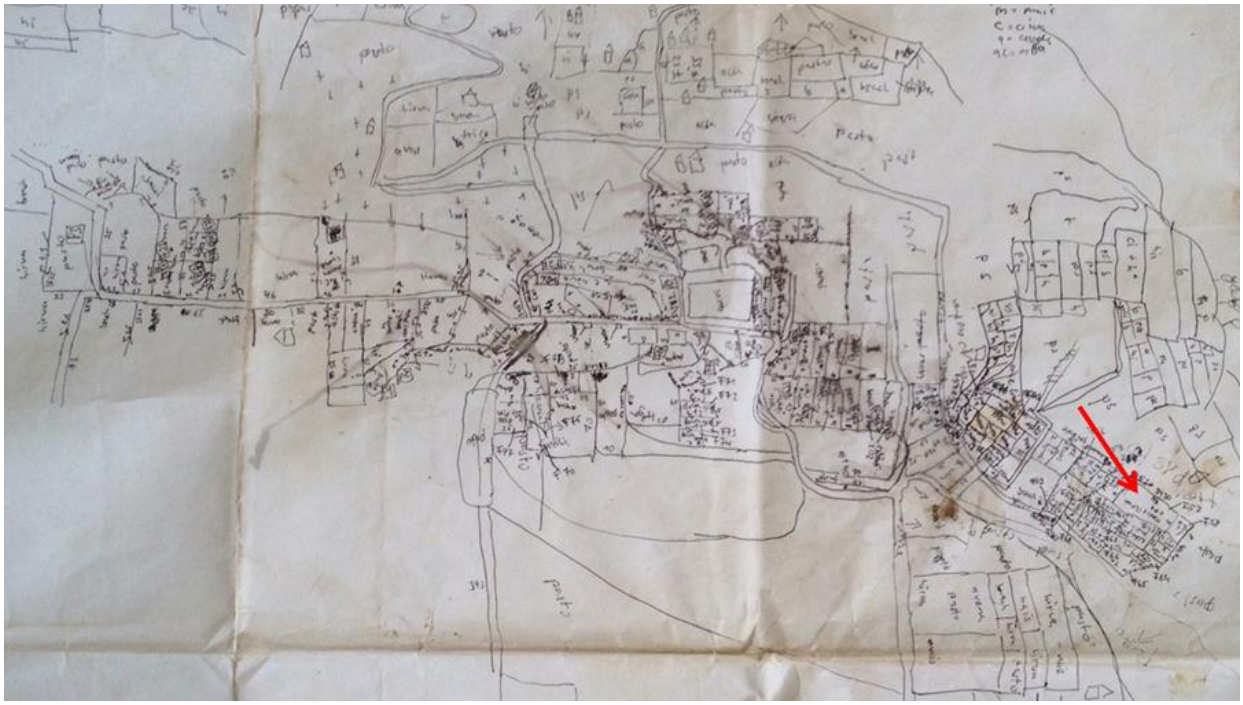


Figure 5 Map of Basquitay with focus plot indicate by red arrow

chosen as the represent two different ways of farming offer good insights in the relation between humans and nonhuman. The third case of Tzimbuto was excluded as being another example of a commercial farm. By focusing on two cases the given time was used to analyse these most interesting cases in depth.

Methods and Methodology

The thesis research started from the plot level. The materiality of the plot was considered the central starting point. Based on the thinking of the Integral Ontology, the assumption was that the materialities of the plot are a central actor in structuring realities. At the same time, material entities were considered to be better observable than territories. So by starting from the entities, the territories were explored. To explore entities and territories, techniques from natural and social science were borrowed. Concerning human territories, ethnographic tools like informal and semi-structured interviews were conducted. The researcher followed the persons to all parts of their daily life also outside farming, including shopping at the local market, church prayers or community meetings. By keeping interviews informal a space was given to ask questions related to the everyday flow of life. Observations could be addressed and by this, things can be discovered and topics discussed which would not be possible during a formalised interview. In formalised settings people appeared to be less open and more bounded by their ideas of what the researcher might expect them to tell. Thus, a major source of information was participatory observations during everyday life and field work. Here, the relation between humans and nonhumans could directly be observed and it can be asked why certain practice is done in a certain way. Semi-structured interviews contained pre-set list of questions asked in a random order to fit the flow of the informal interview. Questions ranged from names of certain plots, which often refer to certain meaning of a site to questions about what is a good soil which sometimes opens a very interesting discussion about the interaction between the nonhuman components of the plot and human behaviour. Similar questions were asked in the different case-study families. Here, interviews were conducted with different family members. There were some challenges here as more interviews were possible with men compared to women. This comes as being a man from outside, it was easier to talk to other men than to women. There is a certain distance between the genders also within the communities. Another challenge was that women often spoke less Spanish but better Kichwa (the local language). Being dependent on Spanish as a researcher, this limited possibilities for interviewing. However, the most interesting data came

from careful observations and small insights into underlying reasoning of people. By this the gender and language distance in interviewing could be compensated.

Another interesting aspect was that the researcher became an object of research himself. It was for instance discussed that fluidity might be experienced as inconsistency. This experience was possible because the research was 'socialised' in a Modern Ontology. So by self-observations sensing of fluidity became possible. For farmers there was no inconsistency of fluid situations as they were not 'socialised' at a Western university.

Methods from the natural science were conducted, as "Through listening to the nonhuman as colleagues in the process of producing knowledge, new knowledges are made possible" (Roe, 2009:252). This was done to understand how materialities can matter to humans and which agencies they can have. For this purpose of course the ethnographic tools are crucial as well. On the focus plots various experiments were conducted, ranging from analysis planting density to bulk density, structure of the soil and laboratory analysis of samples. By this mix of ethnographic and ecological analysis a broad picture was created with idea to follow the way the specific composition of the plot was constructed.

Infiltration test, bulk density test, aggregate stability test, slake test, earthworm test and soil physical observations and estimations, the methods from the soil quality test kit guide published by the United States Department of Agriculture were used (USDA, 1999). For laboratory analysis of soil properties; nitrogen availability, soil texture, pH and soil organic matter, standard laboratory procedures were used. The analysis was conducted by the Farming Systems Ecology Group of Wageningen UR.

Part II. Data and analysis

Chapter 4. Two (frozen) cases of agricultural practices

The following chapter will present the data of the two case studies from the communities of Yanahurko and Basquitay. The data is meant to give context to the analysis which will be presented in the following chapter. Additional, the assumption is that the boundaries between research object and its context do not exist in an Integral Ontology. To understand constitution of realties, a wide focus is needed. This is the purpose of this chapter and the motivation of not putting the data in the appendix, like commonly done.

Yanahurko

The first community where analysis will be done is called Yanahurko. It is located in the province of Cotopaxi in Ecuador. The research started from the plot level, called focus plot. The presentation will start from the bigger picture and slowly will zoom into the focus plot. The focus plot can be found at S01°03'16.7" W078°45'14.3".

The community of the focus plot

In the community surrounding the focus plot, consists of about 250 adults and 400 children which life widely spread on a relatively plane highland at an altitude level of 3600m and 3800m. The community of Yanahurko is relatively new. In the 1960s people from the city of Pujili migrated to the mountain area. Being craftsmen before, they started working for Mestizo (person of combined European and Native American descent) cattle breeders in the area of today's community of Yakopampa ("Plain Water Area") which is the neighbouring community to Yanahurko. As work became scare in the 1980s, the children of these families migrated to the area of today's Yanahurko. However, they first established a village higher in the mountains, compared to today's location. Here, they worked for Mestizo cattle owners. People describe conditions as slavery. In the 2000s people migrated to the current location of the community were they had access to a street and by this to schools, markets and other 'modern' facilities. During the following years, community chiefs bought the land from Mestizos, and families started buying land from chiefs. About 12 years ago, the soil of the focus plot was change from pasture for cattle to arable land. This will be addressed bellowed.

People define themselves as indigenous Kichwa people. The culture is represented in language were Kichwa it is the main language next to Spanish. Next to this, people wear notions of what they consider traditional cloth. Women wear colourful dresses and hat. They twist their long hair into a single braid, which they envelope with a colourful hair band. Especially old women wear embroidered skirts, some of them have big labels telling in English "100 percent wool" and "Made in England". Young women like to wear shirts embroidered with fake diamonds in the shape of letters, saying for instance "101 Dalmatiner", they are made in Ecuador. Men often wear a polo shirts a poncho and a hat. Both genders normally were rubber boots. The community was the only community where lamas and horses are kept for transport. While the horses might origin from the time of the Mestizo cattle breeding, the lamas are considered part of the culture. People ride on them and use them for transport of agricultural goods.

Most people in the community are evangelic Christians, some are catholic. During the last decades, people increasingly shifted from catholic to evangelic. Catholics travel to Yakopampa to visit church. Evangelic people visit church services in the next small city of Pujil. There are irregular events in the evangelic church of the community. There are intensive social relations between people from the same confession like networks of shops, car drivers and people with knowledge. The church building in Yanahurko is the only building in the community without access to electricity. When there is a prayer the church is connected to the power transmission line which is running about 4 meters above the church to have light in the building. Men use a long stick to connect the power line and make the chandeliers light the cold building. While in earlier times, there were conflicts between confessions, today sometimes problems occur between people supporting different political parties.

There are some meeting points in the community. There is a small cheese factory, people wait in front of it to hand in their milk. This space is used for daily talks and transfer of information, like if there is a tractor available for ploughing. Other social spots are the small local shops or the private pickups which connect Pujili and the community. The pastor is addressed as a person with a brought network. This includes external NGOs like the 'Ecuadorian Progressive People's Fund' (FEPP) and EkoRural run projects in the community. Founded by a catholic bishop, FEPP is a Western financed private development institution. There work includes development projects in indigenous agricultural communities (FEPP Social Group: School for Entrepreneurship). EkoRural is another NGO which facilitates community building project in the field of agriculture. Projects in the community include direct material and financial support for

certain families (by FEPP) but also community building (EkoRural). Persons from these organisations are treated with high respect and humility.

The cheese factory (Figure 6) is important in the community, it employs two persons and buys the milk from the farmers of the community. This is an important income source for the family as the school fees for the children are paid by it. Next to this, whey, a side product of the cheesmaking process can be bought by the farmer to feed it to pigs. The profit from the factory is for the community. Next to this the community owns a forest. There were several community meetings to discuss about how to use the resources of the community. The pastor (the farmer to whom the focus plot belongs) initiated the idea to use the profit from the forest for a community credit bank, where people from the community can get financial credits. The meeting to discuss this were hold in a community building with about 60 people participating, the meetings sometimes took more than 5 hours. They were hold in the local Kichwa language and every person has the right to ask questions and to give comments. The head of the community is a group of three women. Furthermore, there is a hot spring next to the community, there are ideas to establish tourism based on this. There seems to be a strong social binding in the community, as there are a lot of cases of mutual help. When a horse escapes and need to be cached or a cow needs support to give birth, people come to help. Other events are football tournaments cattle as reward for the winning teams. Teams are formed by young men from the communities who often however migrated to the city. The teams name themselves like big western football teams. The team of Yanahurko calls itself Liverpool. The football events are also used by candidates of political parties to hold speeches. This is especially before elections. Some inhabitants in the community earn extra money by having a small shop or having a pickup and offering transport to the city of Pujili or other events like football matches in the next community.

Figure 6 In the local cheese factory

In the community there is clean tap water available for free it is used for cooking, washing close and to irrigate plots next to the house. The water generally is available but when there is not enough rain the supply breaks down.

The next football ground can be found in the neighbouring community of Yakopampa. Next to football, it is a focus point of the community, here a school, a public bus and a catholic church can be found. Besides this, it is the home community of Yanahurko as the parents of today's farmer migrated to the area when land became scared in the area. The next small town is called Pujili and can be reached by the local transport arrangements. Like described above, people with cars offer several rides per day in both directions. The ride takes about one and a half hours depending on weather and associated street conditions. Before there were cars, people went by horse or donkey to Pujili. Pujili is the commercial centre for selling and buying agricultural goods on a Sunday market. The city is also an important place to migrate to. There are several families who live in the town but still have a house in Yanahurko where they come to work on their fields once in a while. This means that there is a big community of people from Yanahurko living in Pujili. There is a special evangelic church for people from Yanahurko in Pujili. This is an important meeting point between the two parts of the community living in different localities. Next to this, most children of the community live in Pujili to visit the schools. This includes children from the age of five who life together with their sisters and brothers in one room which is hired in the city. Ambato is the next big city, located about two and a half hours from the community. Here, NGOs like FEPP have an office. Also, special agricultural inputs like *insemination sperm* can be bought. Different to cows, there is no community structure for insemination of pigs.

Concerning plants and animals, welsh onions (*Allium fistulosum*) and potatoes are the main field crops next to pasture and fodder crops. Animals for transport of agricultural products include horses, lamas and donkeys. Farmers keep pigs, cows, sheep and guinea pigs and chicken. Meat and other animal products serve for home consumption or as cash 'insurance' to get direct money when needed. Milk from cows can be sold to a local cheese making factory.

The family of the focus plot

Having introduced the community, in the following the family will be introduced which owns the plot which served as starting point for the case study.

The family (Figure 7) consists of four children and their parents. The father (Melchor) is 36 years old and his wife (Maria) a few years younger. The two boys are six and eight years old and the two girls five and 14 years. The children live in the city to go to school and normally come home in the weekend. The mother is in the city nearly every day to have a look at them,

often she sleeps there as well. The farmer travels to the city about two or three times per week to work as pastor in the church. In fact the family is living in a space between the community and the city, they daily travel between the localities and are integrated in social networks in both place but with similar people. This phenomenon is similar to what will be described for Basquitay. Here, the father also lives in a space in between the city and the community.

Figure 7 The family of the focus plot

Different to the other cases, the parents spread the work relatively equally, both cook and clean, while the mother is spending more time on taking care of the children. In the weekend when the children are at home, roles change. The mother and the oldest daughter do the cooking and take care of the housework while the father is organising new gas bottles for cooking or getting the heavy whey bottles from the cheese factory, his sons are helping him.

Similar to the other communities, the father takes most decision on the farm on what to do and when. However, his wife is engaged in the question of how to do the work, for instance knows she a lot about how to manage the onions, the farmer takes care about it. During the working week the farmer often works alone on the plot, which is why he preference to go to the city to meet people in the church.

As indicated above, people in the community speak the mainly local Kichwa language. This applies for the family. At school and at the city people often speak Spanish. Like in the other communities, the mother speaks barely Spanish as she is less engaged with the non-indigenous population. In fact people speak a mix of both languages. They mix words of both languages as they sometimes do not know the word for one in the other language. The farmer for instance did not know the Kichwa word for *soil* and had to ask his wife. Sometimes the mix is within words. The word for church is diospachwasi which is a mixture of the Spanish word for god “dios” and “pachwasi” which they translate as being a building. Kichwa is a language which developed out

of the Quechwa language. It is the result of relocation and by this mixing of people during the Inca and Spanish colonial time. Thus, it is not a traditional language but the outcomes of the colonial period. Language use is similar is in general similar in the other cases.

Coming to the topic of food, about two or three times a day the father or the mother of the family prepares a hot meal on a gas stove. Different to other communities, it is not preferred and not possible to cook on a campfire. Like in the other communities, the main food is potatoes which are prepared in a soup with carrots, onions, oil, a lot of salt. Sometimes noodles or own milk is added to the soup. Rice is the second main dish which is bought in the supermarket. Guinea pig or chicken meat from the own farm is added to the soup or rice about three times per week. Sometimes meat from other animals like cow is available from friends. By drying it outside on the clothesline, it can be conserved for about one month. Meat has a status to give a good energy and to serve meat is a sign of wealth. About once per week salad leaves are added to the rice. It comes from the vegetable garden and it is always praised to be very healthy and vitamin rich. When there are visitors for a meal, the father presents the salad as part of his philosophy, believing in the bible, producing agroecological and eating healthy. There is a room where the father in his function as pastor meets with for instance the church council. He prepares the room before a meeting by putting poster published by NGOs on healthy food, vitamins including salad. “Tostado” (Spanish for roasted) is dried maize which is roasted in a big pan with onions and salt. It is considered a delicious snack and sometimes it is served with cheese which is the luxury version. The family owns an old pan which is more than 30 years old from the family of the father and shows that the meal was prepared also in the time before the community moved to the current location and in a time when the farmer where still working for the cattle breeders. This is interesting as, different to the other cases, maize does not grow in the community. As farmers say it is too cold and the soil is unsuitable. It shows that there always was a relation to the city where farmers bought the maize. Part of every meal is the “coffee”, most of the time this is a very sweet hot drink which is prepared from a powder from the supermarket. Only very view times, there is little Nescafé powder available which is considered to be luxury. As a snack, for instance during field work, bread rolls are eaten with CocaCola, Fanta or other soft drinks. The bread rolls come from a bakery which is run by an evangelic “brother” in Pujili.

Food has an important social meaning, people invite other people for food. Sometimes they come around spontaneous. When there are friends for food the atmosphere is always happy and causal. Before nearly every meal there is a short prayer by the father to thank for the food

and the company. Sometimes the father forgets about it but he is very consistent about it when people from outside the family join the meal.

Next to the family networks and good relations to people from the community, there are some social networks which will be elaborated on below. The father works together with the NGO FEPP, which financed facilities like a stable for 200 guinea pigs or machinery. The NGO supports the farmer as they consider him an agroecological producer who is influential in the community. Further access to networks comes due to the father's profession as pastor. There were several meetings with the parish council because the farmer wants to gain the official title of being a pastor in the community. There were regular meetings and during a prayer in Pujili where he held a speech he addressed the topic. He was very emotional about showing that he would like to serve good and the community. He also asked for financial support for a document he had to gain to become a priest. The farmer in his role as pastor tried to be as much present in the church context as possible. One day the plan was to plant onions. To do so a tool is needed to dig a vertical whole of about 40 cm to place the onions. The farmer got the tool from a friend. The church is on the way to the friend and at this moment, people of the community were cleaning the church inside with water to prepare it for new paint. The farmer started helping the people and organised a water pipe, started cleaning and discussing plans and colours for the painting project. This meant that the onion planting was shifted from the morning to the afternoon. However, being engaged with people from the community, shifting plans and getting engaged into new ones seems to be a general mood. This flow of getting engaged seems to be far more important than the working plans made in the morning or the previous day. Following this flow is a feature to all cases. The farmer sometimes wanted the researcher to take photos of things, it were things where he seemed to be proud of. One of these situations was when an old woman came. She came about once a week and the farmer always took her to the vegetable garden and filled a box with food for her. He explained that the woman is widowed and has not enough own vegetables, so he gave them as a present to her. Because he is a priest, the farmer had access to different resources compared to the families from the other cases. For instance, he got a laptop from the church in Pujili to do office work. The church and also the laptop were financed by a person from the community who migrated to Spain and send back money. In fact the father used the computer not for office work but to watch videos of a Christian indigenous chorus, these videos were also popular in Tzimbuto. Another function of the computer was to listen to CDs where it was explained how to raise children in a good way.

Other resources the father got after a prayer include for instance, some money, a chicken, two rabbits or a free car ride to Pujili.

Concerning spirituality, the farmer believes in god and made this passion part of his life by studying at a special school to get a priest. Like other people from the community, the farmer visits church for a prayer often more than once a week. There is a church in the community but more often people go to the church for people from the community in the city of Pujili. This is different to the other two cases. In Tzimbuto people went to church about once in a week or less. In Basquitay people where following spirituality outside Christian and did not go to church. Church services are emotional events were often women and sometimes men cry while preying. A prayer in the evangelic church, like the catholic, has different elements but one central part is the music. Here, people participate by clapping hands and singing. Also, there are chorus often consisting of the women of the community. Women singing in the chorus are considered to be high in status. Accompaniment by the extreme loud rhythms of a keyboard, the women perform the songs. The language is the local Kichwa, tone pitch is high and uncommon to western ears. The lyrics are texts from the bible. Women choirs were often costumes in the local traditional-modern style, like described above.

There are some interesting aspects of the family history. The father of the farmer died early. When he was about 10 years old, he did by a lightening in a thunderstorm. He was adapted by the family of his wife. That is why he calls the father of his wife his own father. To get an evangelic pastor the farmer went to study in the city of Riobamba for two years and to Quito for three months. This decision was independent from the family of his wife, which was catholic during this time.

There was a time of crises in the mid-1990s. There was a political and economic crisis and a big earthquake destroyed a lot of houses. Many humans and animals in addition died because of diseases.

Since about a decade, political change caused various improvements for the family. Today the father is proud that today it is possible for his children to visit school. This was impossible until the constitution of Ecuador changed a few years ago. Before he felt suppressed as an indigenous person. There were certain rules in society which represented this suppression, including that indigenous people had to take off their hat when visiting a bank. Today the farmer is proud of his language, culture and his rights as an equal citizen.

The family lived in a straw house for several years. About one and a half year ago, they bought a stone house of another family which migrated to the city to life there.

Vision on agriculture

The farmer describes his agenda of farming as a mix of producing organic and keeping "animales menores" meaning a range of small animals next to cows as tradition of indigenous farming. In fact, as was shown above, the community has a 'tradition' of arable farming of less than 15 years. The farmer presents himself constantly as producing organic. He uses chemicals for his animals and some pesticides. His practices seem to be a good integration of his agroecology agenda, his flexible life (constant travelling between the community and the church in the city) and economic aspects, his crop choice will be motivated below. The farmers vision on agriculture changed during the last years. He tells that about 20 years ago he had no vision for the future, except of being a farmer with a family. Later he decided to produce a lot of potatoes by using chemical. During the last five years this changed and his passion for agroecology, organic production and the Christian idea of the farmer as administrators of Goods land developed. In fact the agricultural practices of the farmers changed very dynamic over time which is a common feature to agriculture. Like other farmers, Melchor is proud of his soil and agriculture. Farmers for instance compare their soil to the one in the city which is considered fine and white, which means very infertile. Or they compare it to what they have heard about other countries like Peru. The farmer says here the soil is worse and does not produce, that is why there is no arable land in Peru. Related to his spirituality, for the farmer there is an important connection between the soil and the bible. From the bible the farmer knows that the soil is owned by good and farmers are not more than its administrators. Farmers studying the bible tread their soil different, they maintain it and put no chemicals. This prevents the soil from dying and keeps production. The farmer names Guatemala as example were people suffer from hunger because they do not study the bible and by this the soils was destroyed. For the farmer, the soil is an expression of hits beliefs. The church owns a big plot in the community and the farmer is planning to establish a plot with Welsh onion and guinea pig manure. For the farmer this is also why he likes his work, he likes to take care of the soil. Something else, he is talks proudly about, is continuing the indigenous way of agricultural. He mentions potatoes as the main traditional crop. In fact he has some potatoes in his vegetable garden. Another part of what the farmer describes as his indigenous identity is being independent from the market. This means to produce most food products on the own farm.

The family produces Welsh onions and the meat consumed themselves. Additional some vegetables and potatoes are grown in a garden, this does not cover the products consumed. Finally, the farmer says that there is no other work available he could do, except agriculture. The motivation of being a farmer (and not migrating to the city) seems to be a mix of spiritual beliefs, cultural identity and economic need.

The family farm

The family owns a bit more than 1 ha of land spread over ten small plots. One third each goes to grains, pasture and welsh onion. The pasture is used for grazing of sheep, llamas and sometimes cows. The grain is mainly consumed by cows and about ¼ is cut for the guinea pigs the family owns. Next to this land, there is at least as much area which is owned by the extended family but it is allowed to be used. This includes two plots with grains which serve as the main fodder source for the guinea pigs of the farmer and a pasture for grazing of cows. Finally, there is a plot the farmer bought in the area of the city of Pujili. It is a capital investment and should be a place where his children can build houses later. The farmer did not know the size of his fields. His most interest was into guinea pigs, he knew that he had about 200. There is one plot, next to the family house which is irrigated. The farmer uses the pipe water to irrigate crops growing there. On the same plot, but out of the range of the pipe (ca 20m), there is a small stream which is used by the farmer for irrigation. He redirects the water to his plot and let it flood on the field. This is done when there is no rain and stopped when the plot gets too muddy. Farmers income comes from various sources, next to guinea pigs and Welsh onion, money comes from selling milk and donations from people in the church. Sometimes animals are sold to get fast cash but average per month. Per month, the family with its 6 persons has about $300 (about 220Euros) available.

The family owns four buildings, two straw buildings and two stone houses. Straw buildings are buildings of one room in various sizes. The walls are about one and a half meter high and made of compressed soil. The walls carry a several meter high roof made of straw. These buildings have the advantage that they are warmer, guinea pigs do not die in here. However, they are considered to be old fashioned and humans should not live in them anymore. They are not maintained and the material is used for various purposes. The pressed soil for instance is used for cleaning the new house. The new house of the family tiled with white tiles. They become dirty very fast as people come from the field with muddy boots and walk into the

house. To clean this, the soil from the old house is spread on the floor, the soil is binding the water and can now easily be swept out of the building. In the family, the stone house are connected, the one is about 40 years old and the other only one year. The straw buildings are relatively new and were constructed about 15 and five years ago. While the family, like other families prefers to live in the 'modern' stone buildings, the straw buildings are considered to be part of their culture and used for animal keeping or to store agricultural tools. About one year ago the family bought a piece of land from a family who migrated to the city. On the land there is an arable plot and some buildings, an old straw house and a stone house which is about 40 years old. Here, the family added a new house for living and stable for the guinea pigs. They finance the project by selling a big arable plot. The home of the family has basic equipment but there is a TV and the family owns two mobile phones, one for the children, and one for the farmer to communicate when the children stay in the city to study. Mobile phone are for communication but contain also videos of church events, mainly women chorus, a military propaganda video and other music videos. These kinds of phones can be found in the other cases as well.

There were several NGOs who build toilet buildings in the community. Each house has its own toilet. Like in many communities in Ecuador there are small buildings next to the house which contain a shower and a toilet. They were built by NGOs, in the case of Yanahurko about 20 years ago. However, the NGO buildings are rarely used. The showers normally have electric heating of the water with a small device on the shower head. However, these buildings are not attached to any power line. The toilets need a lot of water and often this scare, so when people use it, they take a bucket with water to clean it. However, especially men prefer to pie outside, sometimes directly next to the NGO toilets. Often those toilets are used for other purposes, to store things, or in the case of the family to put the laundry on a short cloth line in the toilet when there is rain for many days.

The farmer had a garden where he was doing "experiments" on how to grow potatoes without chemicals. Normal chemical use according to him is five times. Also, because of this he skipped being a potato farmer and shifted to Welsh onion. His strategy to produce organic was by using a lot of manure because he thinks that this would strengthen the plants and by this make them resistant to pests and diseases. Several times he showed the potatoes when eating them in a meal they were not peeled as this is unnecessary with organic potatoes. He also presented them to the NGO staff of FEPP and EcoRural and asked for support and seeds for the old Andean potato

varieties. However, next to the field he stores chemical bags against the Phytophthora disease in potatoes.

Animals

The family has three cows, two female which give milk and one small bull. Cow keeping is different to Basquitay. While in other place animals live in an open stable, in Yanahurko there is no shelter for the cows and no fixed place for the night. Animals stay in the field being on a peg of about one and a half meter. The peg is moved in the morning after milking and in the afternoon. The cows do not get any other food, they are switched between the plot with pure pasture and the one with grains every few days. The manure is left in the field as fertiliser for the plot. Different to other communities, the cows here do not have horns. This is important in other communities as only when they have horns they can be used for tractor work of a plough. In Yanahurko ploughing is done by tractor. This might be related to the short history of arable farming where people directly started to plough by tractor and never had a 'tradition' of cow ploughing. There were two adult pigs and two baby pigs before one of the babies ate too much and died. The pigs live on the bare plots where they dig for plant residues. Like the cows, they are tied and their position is changed once or twice a day. As additional food they get whey from the local cheese factory and the organic waste from cooking. Like with pigs and cows, the three sheep and three lamas of the family are shifted about twice per day. They live on the pasture. The family owns 12 chickens which are still small and do not produce eggs. The farmer hopes that they start producing when they are bigger. During daytime they walk around close to the farm building and in the vegetable garden. As food they get grain which is bought in the city. Sometime one of the chicken is eaten. Finally, four rabbits life in cage in the straw house, the eat fresh grass like the guinea pig colleagues. The farm is guarded by three dogs (doorbell) and two cats (rat prevention) before two of the dogs disappeared, the farmer thinks that they might migrated to another community themselves, probably they got stolen.

In general, animals seem to be part of a different sphere than the plants. While with plants any chemicals have a bad reputation, with animals that is different. To animals various antibiotics and other chemicals are applied.

Guinea pigs

As indicated, one of the main sources of family income are about 200 guinea pigs, this gives them a special role on the farm. Most of them life in the new stable financed by the NGO

FEPP, some of them live in the old straw house. Twice a day they get fresh grasses and grains as food. A challenge is that the food needs to be dry, otherwise the bellies of the animals inflate and they die. One animal, the farmer can sell for $4,5 which is much compared to a *carga* of potatoes (about 60 kg) which is worth $5. The family started with guinea pigs about half a year ago. Since then a lot of animals died because of cold. For the NGO FEPP it seems to be important to test until which altitude level it is possible to breed guinea pigs. Here, cold becomes limiting. Many animals died because of cold while the problem with wet feed seems to be at least as significant. As response to this, the farmer uses the straw from the roof of the old building. It is put on the blank floor, for insulation. Additionally, the straw is used to make fire in the new stable to produce warmth. For this, also plastic rubbish, old cloth and everything burning is used. This also causes an extreme formation of smoke. The few guinea pigs, living in the straw building do not suffer from parasites or cold. The method used in the other cases for breeding guinea pigs is different. Here, they are kept for home consumption only and they are kept in stables about one meter above the ground. This helps against cold.

Several times per year members of the NGO FEPP come to control the guinea pigs. As indicated, FEPP financed the stable for the guinea pigs. Before one of the visits of the "doctor" (polite title for a FEPP person) all animals were removed from the stable to clean and 'disinfect' it. In general this is done every two weeks (Figure 8). The chemical is bought as concentrated fluid and mixed with water in a mobile spraying device which can be carried on the back. The farmer covers his mouth, puts on a rain coat and trousers when spraying. Once this was done after removing all animals from the stable and storing them in boxes outside, another time there were inside the stable. The smell of the disinfection is biting even at a distance of 50 meters. As after this treatment not everything was dead, the farmer took straw from the roof of the straw house and tried to burn the animals. This action was done with special attention before a person of the NGO FEPP was coming to see progress on the farm. The farmer told that they should not see the parasites. One reason for the NGO to support the farmer is because he is producing without chemicals. Next to

Figure 8 'Disinfection' of the guinea pig stable

this method to mitigate diseases, there is a regular use of antibiotics. Often animals have parasites in their skin. Those animals are hold in the hand and the purple antibiotic, coming from small bottles is poured on the animal. One day several guinea pigs died after this treatment because of overdose as the farmer explained. Talking more about antibiotics, while it is crucial for the farmer to apply them, this is not told to the NGO. When a person of another NGO, EkoRural came and the person asked about a little bottle of antibiotics in the kitchen of the family, the wife of the farmer affirms here question if the antibiotic is used for the guinea pigs. However, the farmer was immediately denying and telling that it is only for chicken. The farmer knows that antibiotics are a critical point for NGOs which promote agroecology so he did not want create irritations. The farmer sells is guinea pigs to restaurants. To be able to offer a constant supply and to ask for better prices, he started meeting with two other guinea pig owners to set up a selling network. During meetings it was discussed that quality criteria and quantitative criteria on for instance weight are needed. Additional, the farmers exchange guinea pigs in the network. The father of the family organised the meeting and he did it in the same way like he organised church meetings, with the same structure, a prayer in the beginning and the same intonation. During a visit of FEPP, a group of three local farmers, including the family father presented ideas on direct marketing to FEPP to get financial support. The hierarchy was clear with the FEPP doctor in a high position and the farmers trying to show high respect and good agroecological performance which was supposed to be a criterion to gain support by FEPP. The FEPP doctor also went to different other stables of the friends of Melchor to give comments. He mainly criticised insufficient air circulation. Ammoniac smell is the consequence which kills the animals. The NGO seems to create some unintended inconsistency as it asks from the farmer to produce without chemical and on the other side to guaranteed hygiene levels which cannot be reached without chemicals in a stable with two hundred animals.

The NGO FEPP offered a course to the farmer on how he could turn his guinea pig manure into fertile compost. The compost has an important meaning for the NGO as it seems to represent agroecology and it is expected that the farmers take care about the compost. So there was a place next to the guinea pig stable which the farmer called *compost*. He showed it to his friends as the place where to put the manure and where the manure turns into good fertiliser. Before the NGO worker came, he prepared the compost nicely in shape and put dark soil on top of the yellowish manure. Dark, is how a good compost looks like where manure was converted into organic matter. However, in fact it was no compost in the European understanding, there was

not enough straw available for composting and not enough air circulation which caused mould in the heap. The ‘compost’ contains some straw which the farmers used to mix with the manure. However, the only straw he has available is from the old houses which have straw roofs. So to perform agroecology, he is slowly demolishing the old houses. The ‘compost’ is then applied to the plot around each plant. The compost is not mixed with the soil but places in the soil, when the compost is wet being in the soil, this is an indication for a good ‘compost’.

Concerning working procedures, there are different tasks which need to be conducted. For the animals that eat grasses and grains (guinea pigs and rabbits), the grass needs to be cut. Cutting was until recently done by a small hand sickle. By kneeling on the plot, the sickle is taken in one hand and a bush of grasses in the other, then the sickle is used by cutting it in one strong movement. This can be dangerous, the father of the family cut badly in his finger and needed to go to hospital. The technique is also applied in the other case families and is considered to be dangerous in general. Recently the NGO FEPP bought a brush cutter running on petrol for the farmer. The reason they tell why the farmer needs it is because he badly cut his finger and cutting grass would be faster and by this he would be able to keep more guinea pigs. However, another farmer from the same province told that FEPP also wanted her to have such a machine. She did not understand the usefulness and refused the offer. However, after having cut the grass, it needs to be transported to the house of the family. For this purpose, the grass is collected in hubs and by using a rope, they are bind in packages. They are very heavy and need to be put on the lama, on one side of the back of the animal one package, one in between. Having transported the grass to the house, it needs to be dried, this is done by spreading the grass in front of the stable on the floor and let it dry in the sun, and it is frequently turned. This of course gets a problem when it rains or is cold and the grass does not dry, then there is the danger that animals die because of the reasons like described above. Finally, the grass is stored under a plastic sheet and given to the animals once in the morning and once in the evening.

Plants

As discussed before, Welsh onions are the only field crop grown by the family. Since 25 years, thus already during the time of the Mestizos, Welsh onions is grown in Yanahurko. Earlier the plant was grown for home consumption only in vegetable gardens. Since about 15 year the plant was slowly commercialised. Since some years the family is exclusively growing the onion. Before they grew potatoes like about half of the community does. The father says that there are

various problems with potatoes, it is a "big pain" to grow them. It is a lot of work, needs a lot of inputs and chemicals and the market prices is very low which makes it a losing business. Welsh onion and guinea pigs bring way more and cost way less it terms of time and input. Besides this cost/benefit idea, there is the strong notion to produce according to the bible, like described above.

The way of how to plant onions comes from the Mestizos where the parents of the father learned it. Because of Welsh onion being a typical plant for the family and the community, a plot with the plant was chosen as a focus plot. Indeed, the plant, together with potatoes is the main crop in the upper mountain areas in Ecuador. The Welsh onion is perceived as a traditional plant by the farmer. However, some farmers know that the plant came by the Spanish people. People working on their plots got to know the plant and later planted them on own plants. The Welsh onion can be tracked back to China where it is common since about 200 BC, it reached Japan about 500 AD and from here spread to South-East Asia and Europe. 'Welsh' actually originates from the old German word *welsche* which means foreign. Today it is common in nearly all places in the world while it is used in different ways at different localities. In Japan it is used as a potherb, in African countries often the green leaves are eaten as salad or as boiled vegetables. In some places the plant is eaten as snack after being deep-fried. In the Chinese medicine it has medicinal functions (Oyen and Messiaen, 2004). Also, in the village in Ecuador people know how to brew a medicine from the roots of the plant which helps against stomach problems, it can collect gases from the stomach.

Tools

On the farm, the how is a main tool. It is used for various field task of Welsh onion the main field crop. The tasks include, clearing the plot from weeds (otherwise the plants do not grow well, says the farmer). There seem to be different philosophies about weeding in onion fields. Those people who are growing them for commercial use clean the field on a regular base. The farmer stated that this is necessary for a good growth of the plants. However, people like the stepfather of the farmer grow onions for home consumption only, same for the family in Basquitay. Those families do not weed in their plots. Another use is for digging in the soil when harvesting the Welsh onion. Here, first, a hole is dug next to the plant of about 30 cm depth and then the plant is pulled out of the soil. In general and also in the other case study sides, farmers

are very skilled when working with the how. It is a challenge to use the tool and to put soil at a specific intended place or manage to not cutting plants when working around them.

Climate variation

It is hard to argue what climate variation means for farmers. Farmers often do not know the term or associated terms as climate risk or climate variation. However, farmers observe certain material change in their environment. Change is not always associated to be negative.

There is a change in the material environment of the farmer since about 20 years. It gets more intense since five years. There is for instance an increase in hail damage (Figure 9) as there is more hail and hail corns are bigger. This damages the leaves and cause associated lower market prices as the plant does not fulfil a visual quality standard. At the same time damaged leaves die and crop production is lower. Within one small plot, hail damage can be different because of wind effect; some parts might be more affected than others. When there is hail, plants can suffer from cold. Additional there is more frost, before it occurred about two times per year, now it doubled and frost is more intense. The farmer has no method to handle these problems.

Figure 9 Hail damage on Welsh onion: white dots and snapped off leaves

More problematic however are shifts in rainfall patters. In earlier times there were month of rain and month of drought in regular rhythms. These seasons disappear and there are often long periods of drought and short heavy rain events. Because onions have more diseases when there is not enough water, the farmer is currently is conducting experiments with his onions because he observed that they do not suffer from drought when they have a lot of manure. He puts more manure as he observed that the manure also conserves water for the onions. Against diseases of plants, Biol is used. Biol is a natural pesticide which preparation was taught to the farmer by FEPP as part of an agroecology course. The pesticide is used against worms and rust fungi. It is a mixture of water, cow manure, tropical fruits, sugar, alfalfa and a process of fermentation for one month. It is applied when needed but needs to be prepared long before, this

means that it is often not available. A commonly known approach to prevent pests is to "put a lot of organic fertiliser". If there is a lot of rain, potatoes get root diseases and production is low. The Welsh onion like a lot of water, that is also why the plant onions in hubs, by this the water infiltrates more easy into soil. But if there is drought it is easier with the potatoes, they get diseases but there are more fungicides to manage it. With Welsh onion there are diseases but there are fewer possibilities to manage them. This makes the onion more vulnerable to drought while potatoes are more vulnerable to rain.

The soil suffers of erosion. This is due to heavy rain loads but also due to wind. The farmer is critical towards the farmers as managers of the soil, he says that farmers assume that the soil remains stable but then the rain comes very intense and they have no technology to manage it. The farmer thinks that it is also his fault that he allows the water to dick into his plot. So by creating small channels for drainage this can be prevented. After a heavy rain which cause dramatic erosion (see next paragraph), he said that it did not rain for a long time so he did not expect something like this and therefore not prepared. To manage this for the future, he plans to plant trees against the "terrible" wind, trees can cover and save the plot. Next to this he wants to put more organic fertiliser so that the soil can absorb the rain. Another possibility is to turn land into pasture as the rain is absorbed and hold into it. He thinks that it is very interesting to think about those options for the future. Another effect of heavy rain events are damages of roads. In the community a single day of heavy rain destroyed the mud road to the community, by this there was no access by car anymore for more than one week. This includes that agricultural goods could not be supplied to the farmers market.

Figure 10 Erosion after heavy rain

An example of an erosion event appeared after three days of heavy rain, heavy erosion occurred caused by water plots uphill. The water washed away plants up to 30 meters downhill, the normal small hubs around the plants which include manure disappeared. The root system was open and

plants were lying down on the ground (Figure 10). Besides this, on different places furrows emerged. One of them was up to 50 cm deep. As an indirect consequence some of the leaves turned yellow and died. During the days of the rain no action was taken to save the field. The farmer was partly in the city because of church events and for the rest the time of rain was used in a social way. As no farmer was working, friends and family came along at the farms house. In the straw building a camp fire was made which was activated by burning plastic, rubbish and old wood. People came to sit around the fire. Also, some animals came, including cats and chicken who were coming to sit next to the fire as well. The atmosphere was happy and also business was discussed, it was discussed about guinea pigs. A friend who wanted to start breeding got advice and the farmer gave him about five male and female animals to start. Also, a little cat was given to another family as present. Next to this, the farmer and his wife went to Pujili to some church meetings during the rainy days. This was normal but as the heavy rain destroyed the direct street, people who wanted to travel to the city had to walk for about 1,5 hours to the next village from where the road is more stable and therefore, it was possible to travel to the city. It took two weeks before heavy machinery restored the mud road. As a consequence of this erosion and damage of the plants different actions were necessary to take. Together with the farmer and his wife used the how to create new hubs around the plants which cover the roots and straight the plants again. Often the problem was from where to take the soil to cover the roots. A lot of soil was washed away so there was little left to fill the gaps. Next to this, the smaller furrows which were running downwards were removed and vertical barriers were created. This was done by filling the space between the plants to create vertical rows. However, there was one big furrow which could not be filled up again, it was left to ensure drainage for next time. Due to the rain leaves died. Almost every plant had two or three leaves which had to be removed, otherwise production would be low. Finally, those plants which were washed away had to be replanted. The work of rebuilding the field was heavy as the soil was still wet and by this heavy. The man worked one day on his own and the other day his wife helped. Finally, a furrow was created uphill, on the edge of the field to prevent future water from flooding the field. The farmer took care that the furrow was deep enough and had a good slope to lead the water, he used the how to do so and he was controlling it several times by looking from a distance. He seemed to be sure that this would prevent the field from further damage. The farmer and his wife not seemed to be annoyed by the work or thought that they did a mistake in managing their plot. It was one of the normal tasks which emerged. Looking to the heavy erosion, the farmer was not too concerned, being asked he

replied that the rain was very heavy and he said this like he was concerned but he also was very happy to see that there was actually rain, after several weeks of drought. The damage occurred in the focus plot different to other plots. The plot has a slope of about 5% which facilitated erosion. The plot is raised on the uphill side of the plot and lowered on the downhill side of the plot, this reduced the slope compared to the natural state. The work was done long before. However, being asked about further initiative to turn the plot into terraces, the reply was that the plot is not yet owned by him in a formal way. It is still part of the land of the father of his wife and therefore he cannot change the slope.

In general, the farmer is explaining his mix of livestock as risk reducing behaviour. Market price can break down or weather event like hail destroy the onions it is good to have animals who do not suffer. Sometimes, there are a lot of diseases in the plants so it is good to have the animals as a backup. Sometimes the onions do not suffer from hail or frost but then the market price for guinea pigs drops. The cheese is a stable income source in the community.

Next to this there are changes which are not perceived as negative, for instance are their new plants entering the landscape which is not perceived as negative. Some effects are positive, when there is heavy rain farmers do not work in the field. Instead, there are social gatherings which a social event where stories are exchanged but also it is talked about business plans and cooperation between farmers. At the same time NGOs became more active in the community as they want to save the farmers from the climate risk. This is positive for the farmers as by this there are new sources to mobilise resources. In this sense climate variation is not purely perceived as a risk, disaster or problem but also means new possibilities. The combination of dealing with a different environment and having access to new resources means a change in what it means to be a farmer.

Data from the focus plot

Figure 11 The focus plot on the left

The focus plot

The focus plot (Figure 11) has a sizes of 0,19 ha which is about the average size of a Welsh onion plot in the community. Two varieties of onions are cultivated on the plot at an altitude level of 3650m. Farmers call the plants "cevolla" (Spanish for onions), however it is a type of onion which not forms bulbs and has the official name Welsh onion or Japanese leek (*Allium fistulosum*).

The plant is cultivated in rows with a distance of about 60 cm between rows and a distance of about 40 cm between plants. By this there are about four to five plants per square meter. In earlier times people thought that plants would spread more and therefore need more space, that is why for instance the mother of the farmer taught him a bigger planting distance but he has reduced it. One plant consists of a number of shoots, variating between three and seven. Rooting depth is about 40 cm. The plant is perennial, on the focus plot the onion is in place since about twelve years. This implies that there is no rotation of crops. Welsh onion not needs to be replanted every year and can be harvested about every three month, this makes the plant attractive for the farmers as potatoes have growing period of 8 months and there are more risks. There is fertiliser applied to each plant individually. A small hub of soil can be found around each plant, in here guinea pig manure can be found. On the focus plot the farmer tells that about 40 *cargas* can be harvested every 3 month. One carga is about 60kg of Welsh onions. This means that there is a yield of about 13 t/ha four times per year.

According to the farmer, five years ago production was better, it was higher as there were fewer pests. Then change came as the result of volcano ash, more pollution by cars, cutting down of trees and burning of grassland. The air is not pure anymore. This changed the climate and by this brought pests. Now they put a lot of chemicals and therefore the soil does not want to

produce anymore. Before, there were big potatoes now only small. That is why he tries to reorganise with a lot of organic fertiliser. Welsh onion became more popular during the last years, market demand grew. Therefore, more farmers plant onions, while in earlier times it was only a crop in vegetable gardens. Today's consumers like more the thin onions compared to the thicker ones. This is why the farmer plants the thin variety more than the thick one. Price for Welsh onions dropped by about two third, during the last five years, today one 'carga' (about 60kg) is worth $12. Selling of the onion is done by the wife of the farmer which is typical for the farmers market in Pujili.

The focus plot is surrounded by different other fields. Uphill the there is a step a one meter step to a pasture. One size is covered with onions of the father of the wife of Melchor. In this direction there is also a large potato field. Further down there is a pasture. On the other side there is bare land.

Production performance

The farmer observes a change in productivity of the plot. According to him, about 5 years ago the production was higher and there were no pests. Causes for change are for instance because the ash of the active volcano and as well because of the pollution of cars and the burning down of the grass lands. According to him this causes a change in climate and plants get diseases. "Before the air was pure and now it has a lot of affections." Another problem is the use of a lot of chemicals, since about 20 years. Before, production of for instance potatoes was much higher. As indicated before, today's production is about 52 t/ha per year.

Organic matter

The name of the community, Yanahurko means `black soil´ in the local Kichwa language. Farmers consider the soil of the plot fertile because of its dark colour. Indeed, a soil analysis showed an organic matter content of more than 12% which is very high. The topsoil has a thickness of 2m -3m below there is a very bright subsoil layer. On top of hills this soil layer is thinner, while in valleys it is thicker.

This fertility of the soil has its origin in the volcanic activity in the region. These events are events of natural emergence. However, taking a closer look into soil depth, there is a difference between the upper 40cm which are lighter in colour than the soil below. The different colour corresponds rooting depth of Welsh onion which is about 40cm. Below, soil colour is darker and by this soil organic matter seems to be higher. It seems like there is a mining of the

soil. In general, the soil is related to the history of the community of Yanahurko. People tell that during the Inca period the land was used for agriculture. About 40 years ago the land was covered with the local grasses, then cattle keeping came and change it into pasture and later into arable land. The soil was turned into arable land about 12 years ago. According to the farmer the soil is black of the altitude level and related cold climate. When talking about the soil, he always states that "until now the soil is black". He sees that it is changing and blames chemical fertiliser for it. He observed that soil turned from dark black to "medium coffee" colour.

Manure

Next to forms of organic matter in the soil, there is a club of about one cubic decimetre of manure in the soil around every plant (Figure 12). According to the farmer the manure has the function to support plant growth and to buffer drought by offering moisture to the plant. The way of manure application the farmer learned from his mother, he considers it a traditional technique. However, in earlier times cow manure was collected from the pastures and directly applied to the plant, without mixing it with straw. Today manure is a mix of straw and guinea pig manure. The farmer is supported by FEPP for a project on guinea pigs were they are interested in supporting farmers producing organic. His motivation for organic production comes from the bible. Being an evangelic pastor he exactly knows how the bible is guiding soil management. According to the farmer, a soil is good when it has organic fertiliser because this fertiliser will "change the soil", this soil than is tasty for plants, it is a nutrient and therefore the production is good. To live, a soil needs fertiliser. Manure us applied every 3 month to the plot. The manure is most probably chemically contaminated as it comes from the stable which is regularly sprayed with chemicals, like described above.

Figure 12 Manure in the top 15 cm (indicated by the arrow

Structure

Soil structure influences soil water infiltration and root growth. Often it is negatively influenced by the use of tractors. However, on the focus plot the plants grow constantly since 12 years and ploughing with tractor (25cm depth) was only done when the plot was newly planted. This is represented in the results of a resistance experiment (Table 1), no compacted layers were found. However, the upper parts of the soil which are regularly worked, for instance while weeding, are very soft. Also, in the sub layer plant roots face no resistance.

Soil depth	Resistance
0 - 15 cm	Very soft
15 – 25 cm	Soft
25 – 40 cm	Medium
Below 40 cm	Hard

Table 1 Soil structure in the top 40cm

Soil stability and water infiltration

Soil stability was measured by observe 16 top soil aggregates and watch their resistance to water. A good stability is and indicator for biological live and it is important to enable good infiltration, avoid soil crusting and by this it is important to avoid erosion. On a scale from 0 to 6, average soil stability is 4,9 which is very high, while in Basquitay stability is even higher. However, this did not save the soil from heavy erosion. There is data available on structure and stability of the soil (Table 2). While aggregate stability is constantly strong, their size gets from fine to medium starting at a depth of 20 cm. Grouping shows a granual structure, only below 30cm it gets blocky. The structure means nearly ideal conditions for root growth of plants and water infiltration.

Depth	Grouping	Aggregate size	Aggregate stability
0 -10 cm	Granual	Fine	Strong structure
10 – 20 cm	Granual	Fine	Strong structure
20 – 30 cm	Granual	Fine/Medium	Strong structure
30 – 40 cm	Blocky	Fine/Medium	Strong structure

Table 2 Soil stability

Water infiltration rates are high, in average an infiltration rate of 2,1 l/m2/h is possible. This reduces risk of erosion. However, after a heavy rain even, dramatic erosion occurred. Furrows of about 50cm depth occurred which caused an erosion of more than 8,5 m3 of soil within a few

hours. The soil has a slope of about 5%, which is related to the social space of the family. As the plot is still officially owned by the father of the farmer's wife he is restricted in his ability to for instance construct terraces.

Nutrient availability

The pH of the soil is 5,2 which means it is strongly acid and lower availability of nutrients for plants. Bacteria and fungi have various functions in the soil food web. Additional bacteria for instance convert the organic forms of nitrogen into ammonium. However, due to the low pH in the soil, there is hardly any bacteria life possible.

However, looking to Nitrate there is an availability of about 170kg/ha which is sufficient for plant growth. With 0,6 g/cm3 bulk density is very low but normal for Andosols soils. Andosols are volcanic ash soil. Low bulk density offers optimal root growth. Also here, a link to the manure application systems and by this to the bible and the NGO can be recognised.

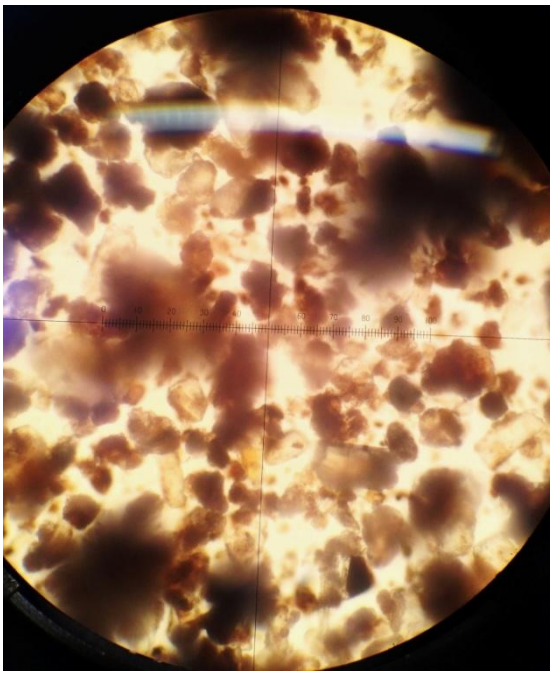


Figure 13 The soil of the plot under the microscope (40x zoomed)

Texture

The soil of this plot (Figure 13) consist of 7,0% particles which are smaller than 2µm, 52,9% between 2µm and 50 µm and 39,8 % which are between 50 µm and 1mm and 0,3% between 1mm and 2mm. So some particles are 1000 times bigger than others. This constellation is classified to be a silt loam.

Basquitay

The second focus plot comes from the community of Basquitay. It is located in the province Chimborazo. The location of the plot is S01°48'56.8" W078°40'43.4".

The community of the focus plot

The community consist of about 450 people which life spread in a mountain valley about 3450m to 3550m high in the mountains. Farms are spread over a wide area without a village centre. The community has a long history, different to Yanahurko people do not know since when the community exists. The name of the community dates back to the pre-Inca time (before the 15. century). People think that the name "Basquitay" is part of the language of this time. Over the valley ruins of houses made by mud can be found. In earlier times the land was owned by Mestizos. Different to Yanahurko people were not directly working for them. The land was owned by the Mestizos and the farmers had to make cloth from sheep wool to pay for the rent of the land. In those times all land was collectively managed during every day mingas. This is why until about 50 years ago, there was a lot of sheep breeding in the community. During the last decades, there is a constant migration to cities, especially to Riobamba. Some families still cultivate plots in the community while they live and work in a city. They come back a few times per month. Often the man of the family works in the city and comes back at night. This is why women do the agricultural work.

People consider themselves as indigenous Kichwa people. This is strongly represented in the local Kichwa language. People are proud of their language and emphasize the local difference of Kichwa, with different accents and words in the different regions of Ecuador. Especially elder people and women hardly speak Spanish while today's teenager generation speaks both languages fluently. Spanish is often not learned at home but at school or when working in the city. People wear traditional cloth mixed with modern. Women wear colourful folded blankets as cloaks, which are used as protection against cold, rain and sun. Often they are also used to carry things or to bind together fodder grass or firewood. Women twist their long hair into a single braid, which they envelope with a colourful hair band. They wear dark skirts and rubber shoes when walking. Some younger women wear rubber gloves for fieldwork. Both, men and women wear hats. Men prefer rubber boots and wear polo shirts and suit trousers when working in the field. When there is rain, people put plastic bags on their heads to protect them. During work in the field old, but also young man and woman sometimes work barefoot. It seems to be more

comfortable as the soil does not get stuck in the shoes but there it also indicates a spiritual connection to the soil which will be discussed later.

Concerning religion, there are equally catholic and evangelic people in the community but institutionalised religion seems less important compared to Yanahurko. Some people visit church services mainly evangelic one.

Compared to the Yanahurko, social life in the community is less informal. Farmers work more for themselves and there are fewer interactions like spontaneous helping out when needed. A common meeting point like the cheese factory or a shop does not exist. Instead, social interactions are more formal. There is mutual help between the families by an arrangement called "trae mano" (Spanish for bring hand). This arrangement between two families means that people from the one family work for the other for one day as exchange for a working day by the other family. From one working day of harvesting, the family helping gets one big bag of the harvest. This system is also popular in Tzimbuto. Another arrangement are so called *mingas*, which are collective working days on communal land. Different to Yanahurko, there are several plots where the community grows crops, the revenue is for the community. Crops on these plots included different potato varieties, quinoa and beans. In Tzimbuto there is no arable land but communal forest, the wood is used to maintain an irrigation channel. To those *mingas* in Basquitay, about two third women come, probably because the men work in the city. These events are very social interactive, people chat and have fun, for instance by throwing green potatoes at each other. People in the community like to listen to the radio. Most popular are Kichwa programs which also play local music. People put on their music and let it run the entire day even when they are not at home. Basically every day, one family takes the indicative and puts the volume high. Because of the small valley, the sound can be listened to by various families working in the fields.

There are some important actors in the community which coordinate for instance the work during the Mingas, including the head of the community and the pastors. The head of the community is elected every five years, his job is voluntary without payment. The pastors have own farmers but also receive regular gifts and money by other community members.

Recently the community constructed a large football field by levelling communal land with heavy machinery. To finance this, the head of the community collected about $50 from every family of the community. That shows that there is outmigration on the one hand but investment in the future at them same time. The community of has a primary school and two

churches, one evangelic and one catholic. Milk from cows can be sold to a local cheese making factory of another cloth by community. There is a community building which contains a big room and a kitchen building. This place is used for community meetings where there are meetings every about two weeks to discuss topics concerning the community. During those events some women cook food. The food cooked comes from communal plots which are managed during collective working days ("Mingas").

There are some groups of farmers who are supported by the NGO EkoRural. These projects are on community building and use of agroecological practices, as well as on an alternative market project in Riobamba. The latter offers farmers stable prices for their products by selling them in a so called canasta (Spanish for basket).

The community is restricted in water access, tap water is only available about once a week and it is considered to be dirty. It is charged for the tap water, like in Tzimbuto but different to Yanahurko where it is free of charge and clean. There is a community watering place where people go to pick drinking water with water canisters for free. Here, cloth is washed as well, while sometimes a little stream at the bottom of the valley is used.

There is a mud road to the community. As people live widely spread over the valley, most families have to walk about one hour to reach a road with public bus transport. At about one and a half hour walking distance, there is the next village (Talarong) where farmers can sell and buy animals and vegetables. The next little town is called Flores where people go for the municipal administration, it is about three hours by foot or one hour by car. The big city of Riobamba is the main focus point where people migrate to for work, it is about one hour by public bus. Here, people buy and sell goods on a farmers market. The main crops in the community is potato (Solanum tuberosum) followed by faba beans (Vicia faba), maize (Z. mays subsp. Mays), oca (Oxalis tuberosa), ullucus (Ullucus tuberosus), mashua (Tropaeolum tuberosum) and quinoa (Chenopodium quinoa). Besides this there is pasture and different fodder crops like oats (Avena sativa). Other herbs and grasses growing in the field margins are used as fodder for animals. This includes for instance wild growing rapeseed.

The family of the focus plot

Having introduced the community, in the following the family will be introduced which owns the plot which served as starting point for the case study.

The family consists of six children and their parents which are engaged in the subsistent farm. The father (Francisco) is 51 years old and his wife (Maria) 49 years. The father works for a Western financed NGO in the city of Riobamba but he returns home every night. The youngest son (Paul) is five years old. There are two older sisters, how both live at home, the 18 years old Ermelinda and the 14 years old Karolina. The daughters mainly work on the family subsistent farm. Sometimes they work for another family in another community and only come back in the weekend. The older daughter is doing a course one day per week to become a secretary. The young son is in his first year of primary school but he often prefers to stay at home. Two other sons life in the city of Riobamba, were they work as construction workers. According to the mother, people marry when they are 16 or 17 and normally migrate to the city.

The mother often gives up to set limits for Paul. He does everything he likes to do, including, not going to school, torture the cats or demanding special food. He only is afraid of his father when he threatens to hid him with his belt. Paul seems to have an important function for his older sisters and the mother. They always laugh a lot about him and seem to be happy. This is rarely the case without him.

Roles in the family are split clearly. The father travels to Riobamba every day for working, he leaves the house early in the morning and comes back late at night. He earns the family income of about $250 (about 185€) per month.

The father work is not clear for his family, they have ideas about what he works but what he does during the day remains unclear. When coming home at night, he discusses with the mother what work needs to be done at the farm. His wife is doing the agricultural work together with the children who life at home. Additionally, they cook and take care of the house. Only sometimes, when the father comes home earlier, he helps with agricultural work. The father is overweight and has problems with a leg after a crash with a motorbike on his way to work. This restricts his ability in working in the field. However, there is clear difference in hierarchy to Yanahurko where agricultural and domestic tasks where more or less equally spread among man and woman. The wife travels to the city about two times in a month for shopping. Then the children stay at home and the oldest daughter takes the role of the mother.

As mentioned before, the main language in the community is Kichwa. Also, at the local primary school the teaching language in Kichwa, school books are in this language as well. As described for the case of Yanahurko, Kichwa is a language which developed out of the Quechwa language. It is the result of relocation and by this mixing of people during the Inca and Spanish

colonial time. There are a few small exceptions from talking Kichwa, when talked about money, it is switched to Spanish numbers. In general the little son and the mother speak only a few words Spanish while the older children and the father are bilingual. The mother of the family has a small wooden spindle which she takes with her when for instance walking to school with the little Paul. The wool she uses is from Lamas but and comes from outside the community, there are no Lama in community. The wool is transferred to threads which are used for weaving of the typical colourful belts the women wear.

Two or three times a day the mother prepares a hot meal. This is normally done on an open camp fire, only when it has to go fast, a gas stove is used. For this purpose there are two different kitchens. Reasons for the preference of camp fire are that firewood is free available from shrubs and trees at the field margins. Another reason is that the family claims that tasted is different and much better. Additional the family believes in the positive energy the fire from wood gives to the foot. However, to light the fire, diesel is used. To support the fire when it does not burn well, sometimes paper from the schoolbooks of Paul is used. The main food is the family grown potatoes which are prepared in a soup. Rice is the second main dish that is bought in the supermarket. Guinea pig or chicken meat from the own farm is added to the soup or rice about once or twice times per week. About once per week fish is eaten with rice. The fish is tinned fish bought in Riobamba. Like in the other cases, part of every meal is the “coffee”, which is normally a very sweat tea made of herbs bought on the market or from the family garden, for instance minces. This tea is also important to give good energy to the family. Lunch is often eaten in the field. It consists of cooked faba beans and potatoes with salt. As drink, soft drinks like CocalCoal or Fanta are popular. As an alternative, sometimes tea is made of local herbs which are transported in old CocalCola bottles. When heaving food it is normal to invite people working on neighbouring plots or bringing them a part of it. For dinner often *matchika* is available. It is flour made of grains from the plots of the family, milled in Riobamba. It is mixed into the “coffee” and turns it into a nourishing porridge. It is considered to be the traditional bread. Like in the other two communities, *tostado* (roasted maize) is popular as mixed into the soup or eat as a snack.

Like in the other cases, food is about identity. This is most applicable to the family of Basquitay, which is proud to eat own products and to be independent from chemical produced food from the market. The father often tells proudly that family eats only product from the own farm, except for sometimes rice. Father says that family consumes no meat but they do about

twice a week. They also buy cow meat. In fact rice is eaten about every second day and by this more often than in the other two communities. A typical buying basket contains paprika, tomatoes, bananas, a big bag of rice, sugar, mangos, cherries, bread, goose foot and plastic toy for Paul.

Different to Yanahurko but similar to Tzimbuto, there is no table to have dinner in the family. People sit on small wooden blocks around the fire. The atmosphere is cosy. If someone has a cold or a bad stomach, the family blames CocaCola for it. The mother of the family knows how to make a tea from local herbs against stomach problems. She collects more than 10 different herbs from the landscape around the house to prepare it. When eating in the field, there is one big pot with rice or beans and potatoes where everyone is eating from. Often there are a few spoons which are always put back after eating once. Some people use their hands for eating. This makes having food to a social event of sharing. In the kitchen an important tool is a little plastic container which is used to wash potatoes or for cleaning the intestines of animals before cooking them. The container has patterns on it which represent a man and a woman in dirndl-like costumes which are common in Austria or Southern Germany.

Next to the family networks and good relations to people from the community, there are some social networks which will be elaborated on below. On the plots of the family maize does not grow well. However, as mentioned above, the daughters of the family sometimes work in another community. They are paid in agricultural goods which is often maize. This is possible as the father arranged that his son is the godchild of the richer farmer from another community. This other farmer is catholic. This is why the son is catholic baptized, thought the father is formally evangelic but in fact not is Christian. Sometimes a woman from the community comes to visit the family. Then the women delouse each other and make each other's hair. The father works for different western finance NGO since the last 20 years. This changed the family's agriculture. Earlier, there was an extensive use of chemicals which is significant less today. Via his work the father introduced techniques and knowledge on for instance agroecology and terraces to the family farm. The father of the family is the head of the community. This is not offering direct revenue but it makes him a respected person which is something he acknowledges. When he travels to the city in the morning he has the privilege in the bus to sit on the big chair next to the driver, where people come to talk to him from the back of the bus. There are relations with the *trae mano* principle, like presented above. About every week there is a day where the working force is exchanged. Similar to the *trae mano* principle, the daughters of the family sometimes

work in another community where they are paid in the form of maize. This offers the family access to more maize, on the family plots, maize is grows less good. This comes probably because the other family uses extensive amounts of organic and chemical inputs to grow maize. Compare to the other two case study sides, the family lives with less social contacts. There is one woman coming about once per week and then women sit together, talk and dress each other's hair and delouse their heads. In the other cases there is way more people coming around for meals, to burrow tools and or just have a talk. This might also be related to the position of the house on the slope of the valley. People do less pass around the house when walking to their plots.

Concerning spirituality, the family believes in a philosophy of energies as spirituality. According to the father of the family, all objects like trees or mountains have certain energy. Most important is the sun and the moon. If a person or also the plants of a plot do not perform well they suffer from "bad energy". For humans there are bracelets to ban the energy but also the consumption of herbs in tea, like done every day in the family, is supporting good energies.

According to this philosophy there should be an agroecological treatment of the soil because chemicals destroy good energies. This is also why the family argues that you cannot cook a good meal on a gas stove. The family claims that they organise their work according to the moon calendar which they consider as part of their traditional Andean agriculture. It gives indications for every what work to do and on which days it should not to be worked. The booklet with the name "calendario agrícola" describes itself to be based on the Biodynamic agriculture (see Figure 14).

Figure 14 Moon example page with agrochemical advertisement

The method is based on the philosophy of the Austrian Rudolf Steiner. The website of the publisher shows that the calendar is offered for various countries in South America and the Western countries. One of the two publishers is a German electrician who works for a company offering renewable energy solutions in Ecuador, they work together with international NGOs like the evangelicalism World Vision. In the booklet of the calendar, there is advertisement for chemicals, the company Ecuadquimica for instance has an advertisement for a chemical which promises to reduce effects of hailstorms by an antitranspirant. It seems like the chemical industry mobilised climate variability to sell chemicals. The moon calendar is widely used but not always, for instance on the fifth of February the calendar asks to do nothing, however work was done. On the twentieth of February, not working was recommended and indeed no work was done. The spiritual philosophy of the father is can be considered as part of his work. He works for a western NGO in which offices different agricultural calendars can be found.

Concerning history of the family, there is some tragic part in the father's history. His mother died when he was about eight years old. Therefore, he left school and helped his father working. Later the father went to an alternative school which is not recognised by the government, he specialised in Andean medicine. Until today the father of Francisco works with the family. He now is 72 years old, hard in hearing but works in the field like everyone else. The family of the mother comes from a different community but she has not visited the place for many years.

Vision on agriculture

Part of the identity of the family is to be independent from the market which drives them to grow as many crops possible on their own. Next to risk reduction, this is why they plant a wide variety of plants. This striving for independents includes also the children living in the city. The family plants for instance potatoes also for the son living and working in Riobamba. Next to the striving for independence, especially the father is proud to produce without chemicals but with agroecological methods. This includes the use of manure, of Biol (described in the case of Yanahurko) and the use of terraces. The father of the family has a long tradition in working for different NGOs. About 15 years ago a person came to visit the farm of his family. He recommended to plant trees in order to protect the plots. Today the father compares the function of trees to a coat, it protects the plot from damage by wind, intensive sun. At the same time it has positive effects on soil moisture as wind speed and by this evapotranspiration is reduced. Organic

matter is supplied to the soil. This is the function of the trees like it is presented by the father of the family. He uses these kinds of stories to present himself as a pioneer for Agroecology. This is linked to his engagement with politics. Next to being a communal chief, he is actively supporting an indigenous political party. There were communal elections during the time of the research. So for instance during one of the mingas in the community, the father was advertising for his political party. Sweets, pens, matches and posters with labels of the party were distributed as presents. Using an example ballot, he explained where exactly make the cross for the indigenous party. He especially addressed analphabetic members of the community. The father always describes his family as poor. When asked how much land he has, he responds that is *little*. Being asked the same question, his wife responded that it is *enough*. The father is known as politician by other people, as person who knows how to mobilise agroecology and independence as values for poor indigenous farmers. Sometimes this rather political idea of the father clashes with the practical agricultural work his wife is doing. As the mother of family is conducting and managing the agricultural tasks as well as cooking, she is also responsible for firewood. This means that she cuts down huge amounts of wood. Here, focus is rather on getting most wood possible in an easy way and not to conserve hedges and trees in a way of optimal protection of the plots. There are a lot of problems with diseases in plants, production of for instance potatoes is very low compared to Tzimbuto. To fight especially diseases in potatoes, the wife is spraying pesticides. This is different to how the farmer presents himself but probably the only way to be able to maintain a minimum production level, with having very limited access for instance to organic manure.

Family farm

As mentioned before, the farm is a subsistent farm producing for the family, also for those in living and working in the city. The family owns about three hectares of land which is three times more than in Yanahurko. The father of the family often says that he is poor and only owns one hectare of land. However, some of the plots are only a few square meters big, there are about 80 plots of the family. There are some plots the family is using which are owned by other families which migrated to the city. A main feature is intercropping of various crop types and varieties. About ¾ of the land is arable land and the rest is fodder crops. Like mentioned above, the farm is governed mainly by the father and run by his wife. This was different in earlier times when the father of the family and the bigger children were working on the farm as well. The father of Francisco earlier owned much of the land. During those time there was mainly sheep

breeding, as indicated above. The father of Francisco had about 60 sheep. Since the 1980s the family produced with chemicals. Since about 10 years the farm turned from a commercial farm using chemicals to a subsistent farm. The father tells that today the family produces without chemicals which is not true. Referring to pesticides bags on the farm, the wife explains that there is a regular use of pesticides. Compared to pesticide use in Tzimbuto (about five times in potatoes), it is less in Basquitay (about two times).

Like in the other two cases, the family owns several buildings. The family owns three houses. One is the old house of the family which is located in the valley, the two other houses are connected and locate a bit uphill. One of the two was built about 30 years ago, the other about 20 years ago. The houses uphill were bought from the family of the mother's sister which migrated to the city. The two are both used and include the normal "kitchen" where food is cooked on a campfire, there is another kitchen where there is a gas stove which is used when food needs to be ready fast, food from the open fire is preferred because of the different taste and because it is cheaper than gas and does not has to be paid for. There is one room where the family sleeps in which include two beds and a TV. Sometimes the father brings DVDs to watch them on the TV. Once he brought different DVDs of local carnival made by amateur filmmakers with shaky hand-cams. Carnival is an important event during the year. People are allowed to drink, to dance and wear crazy cloth, like men in women-cloth. For people this seems to be the most important party of the year. Another DVD the father brought was a home copied DVD from Discovery Channel. The topics were polar Bears at the North Pole and Lions in Africa. Finally, there is a new room where the older daughter sleeps. The farmer owns a mobile phone where he is busy answering phone calls during the day. In the house, there is only one very small spot where there is network connection which depends on whether condition. Reliable service can be reached when going uphill. Like described above, radio music is popular in the community. In the family's house, there are radio boxes in various rooms. The family owns two toilets, one is an NGO build one and one is a whole in the ground covered by a roof. The NGO toilet is not used as there is no water available for the modern facility.

Animals

Like in the other two cases, the family has animals for home consumption and for selling. There are two gees and seven chickens which both produce eggs for home consumption and for selling. As food they get two times maize and once rice per day, which is significant more extra

food compared to Yanahurko. Part of the chicken live in a modern stable which was recently built and which contains plastic equipment for feeding. Chicken living here are bough as babies and rose to be sold. The other chickens live outside and are for home consumption. There are three pigs which stay in bare plots during the day to search for roots and plant residues. For the night they stay in a stable where they get the organic waste of the family and milled barley solute in water. Compared to Yanahurko this is way more food, in Tzimbuto they get even more food. There are two cows which give milk which is sold for $0,45/l (ca 0,33 Euro) to the cheese factory of the neighbouring community. Milk is then filled into an old three litre CocaColar bottle and carried by the oldest daughter using a blanket to bind it on her back. The cows can be fertilised which costs $20, while it was for free in Yanahurko. Next to milk production, the cows are used to pull a plough. There are two calves and one small bull which belong to the oldest daughter. She will sell the bull when she needs cash to start a family. The cattle get grasses and grains as well as residues from faba beans for food. Often they are also taken to the field to grass in the field margins during day. When there are family parties, guinea pigs and rabbits are eaten. For this purpose and for manure production, the family keeps about 40 guinea pigs and two rabbits. Of the 40 guinea pigs, about 30 live in an old house, the family used to live in. The rest lives together with the rabbits in a raised cage next to the house. The floor of the cages is made of a wire mesh, the manure drops through it and can easily be collected to fertilise the plots. The animals get grazes from the field margins. Furthermore, there are five sheep before one suddenly died for unknown reasons, it was eaten by the family. The sheep stay on a pasture during the day and have a stable for the night. Cows, chicken and sheep have a stable for the night. This is to collect their manure and to protect them against cold rain as they get thick by it. For transport, there three donkeys which live on a pasture, they sleep on the pasture and they are pegged on a robe of about two meters. Next to animal which can be consumed or sold, there are two emaciated dogs which work as bell. Furthermore, there are three cats which catch rats and which are friends of the humans, they are the only animals who have names. When the family needs cash, an animal is sold by the wife. This is done on the farmers market in the next community or on the way while walking to it. On the way there are buyers' with trucks looking out for farmers who are willing to sell their animals. Especially cows seem to be popular for buying. They are working next to the farmers for more than half an hour to check the quality of the cow (teeth, walking behaviour, shape and milk production). Then they make offers which are refused and new offers are made. Finally, an adult cow is sold for $380 (about 280€). A pig is worth about

$120 (about 90€). If the price to be negotiated is not high enough the farmers refuse the offer and take back home the animal.

Grass from the field margins are cut for guinea pigs, rabbits and cows. For cows additional oat and alfalfa is cut. Cutting grass is similar to Yanahurko and Tzimbuto. By kneeling on the plot, the hand sickle is taken in one hand and a bush of plants in the other, and then the sickle is used for cutting in one strong movement. Transport here is done of the back of the people. By using a cord technique, the heavy packs (about 40kg) are fixed on the backs of people and then carried to the house. This is a heavy procedure, especially as the location in the valley means transport often is uphill. Different to Yanahurko, the grasses for the guinea pigs do not need to be dried. Because of the lower altitude, risk for the animals to die is lower.

Plants

The family grows nine different plants mostly in intercropping. Most production is potatoes followed by faba beans, maize, ullucus, mashua and quinoa. Often different varieties of the plants are grown, for instance two varieties of quinoa and four different potato varieties. Wheat and oat are grown for human and animal consumption. For cows, alfalfa is additionally grown. Other herbs and grasses growing in the field margins are used as fodder for animals as well. This includes for instance wild growing rapeseed. The scientific names of the plant where mentioned above in the chapter of on the community. Potatoes are the major plant in the family. As limited fertiliser is available and limited pesticides are used, potatoes appear to be small and to have many diseases. On a plot nearby, the community grows similar potato varieties on a communal plot. Here, chemical fertiliser and pesticides are applied. Potatoes here appear to be three time bigger and having only a few diseases. Faba beans are the second major crop. According to the farmer the year was very dry and therefore, height of the plant was significant lower and production of beans was very low. Because of the trees in the community, birds life here and as they like to eat beans, thus harvest for humans can be very low. Faba beans are considered a local

Figure 15 Spreading beans from straw by using the wind (on the right)

indigenous plant but they come from the area of today Iraq /Iran (Link et al., 2009). Like with grains, differ mechanical work and the wind is used to spread the straw from the beans (Figure 15).

The root crops of ullucus and mashua were introduced by NGOs to the community. They are plants which were grown in Highland for a long time before they disappeared as part of modernity. These root crops are today cooked and consumed like potatoes and are considered to be very tasty. Quinoa, like potato is low in production on the family plots compared to communal plots. This is considered to be related to the inputs of chemicals on the communal land. Wheat is grown mainly as fodder crop for cows but also used for home consumption. The latter is a lot of work as every single grain is separated from the straw in a long working process without machinery. To separate the wheat from the chaff, the woman first spreads the grain on a plastic sheeting. While walking on the grain barefoot, she is rubbing the grains between the feet. By this the grain is separated from the grain hulls. While doing she fold her hands on the back, it looks like a dance. Then she uses a sieve to separate the parts and as final step let the grain fall on the plastic sheet while standing, by this, the wind carries away the grain hulls. When working with the wind, she is whispering words in Kichwa, the local language. She explains that this is to call for the wind.

Wheat is another example of an imported crop, it originates from Asia (Gibson and Benson, 2002). Like wheat, oat is used mainly as fodder crop for cows and very limited for home consumption. The plant originates from the Mediterranean (Suttie and Reynolds, 2004).

Planting of fodder crops is often done in monoculture while crops for consumption are planted in intercropping. According to the father intercropping is done because of the symbiotic effects of crops, for instance between faba beans as fixing Nitrogen and potatoes demanding it. According to his wife, intercropping is done because sometimes one crop does not produce well and then other crops survive. On one plot, for instance, except for maize, all plants not survived. The wife tells that it was not enough water for all, so only maize survived.

This is similar to the reasons for the use of various crop varieties. In some years some varieties of potatoes are for instance more effected by diseases than others, so one variety survives others not. There is a red potato variety which is less vulnerable to diseases but does not produce well, so potatoes are small but without diseases. There is a rotation of crops. According to the father, after arable crops like maize, potatoes and beans, fodder crops are grown. However, his wife says that often the arable crop mixtures is grown for years. The wife decides based on

what the soil tells her for the following crop. For instance when faba bean roots show some white/blue colour in the soil, she says that the bean wants her to plant potatoes next, she follows this advice. Thus, crop rotation seems to follow the flow by the plants.

To manage pests and diseases in the focus plot, the family uses a mix of three strategies. According to the farmers they use a lot of organic manure to support the plants and strengthen their resistance to diseases. This technique is limited by the very limited availability of manure from the animals at the farm. The second strategy is to apply Biol about three times per year. This self-made organic pesticide was introduced recently by NGOs. There are different recopies how to prepare it, in Basquitay people have to buy expensive inputs like rock phosphate at the market. A third strategy is the use of classical chemical pesticides which are applied in backpack sprayers like the Biol. Thus, there is a mix of so called traditional (organic manure), modern (chemicals) and alternative modern (Biol) techniques. The meaning of the different techniques is different ranging from proud to do (organic manure) too good to know how to do (Biol) to finally not telling in public (chemicals). When using the backpack sprayers for Biol, it is mixed with chemical pesticide. It is not clear if Biol is used as performance to apply chemical pesticides. Classical modernity (chemicals) in this case is used in a hidden way by performing the alternative agroecological modernity approach. In earlier times the family used chemical pesticides in an extensive way. This was changed after the switch to agroecological modernity. The material change can be found back in the soil as a change to more organic matter, Biol or chemicals.

Figure 16 Faba beans of different qualities: green for humans , black for pigs

When working in the field, the hoe is a main tool. It is used for various field task. The intercropping ridges are cleaned from weeds,

or when preparing the plot for seeding the ploughing is done with the how. Also, for the harvest of the root crops, the how is used. For instance for potatoes, the how is used to turn the ridge and by them get to the potatoes inside the ridge. Concerning faba beans, there are two possibilities to harvest, one is when plants are still green and beans soft, or when the plants are dry and already turned black. The first, the fresh possibility is applied when only a limited amount of beans (Figure 16) is needed for a meal. Then the bean pods are harvested and then the beans are pulled out at home.

Another method is applied when a big plot is harvested. In this case it is waited until the plants turn black and are dry. Then the entire plant is pulled out of the soil and the plants are collected on a hub. Then some are spread on a big plastic sheet of ca 5mx5m. Then a wooden stick of about 1m length is used to strongly hit the plants. By this the beans are loosened from the pods. The straw is now controlled to see if all beans were dissolved. This is done by taking out the big plant straw. To separate fine parts and beans, the wind is used. People let fall the plant parts while standing and the wind takes away the straw parts. After this process which takes several hours, the beans remain. However, a next step is to collect all the beans which are damaged or are black and by this are not eatable. This is another time demanding process. When harvesting potatoes from a big plots (more than 0,4 ha), work is often done with a couple from another family. This form of mutual help works like an exchange system, when two persons work for the other family for one day, there is another day when the family gives back the work on another day. In addition, the helping family receives a share of the harvest, which is about 1/3.

Seeds

The family has own seeds. After harvest they select the best part to use them as seeds. For potatoes for instance, potatoes are spread on the floor in the sun to let them dry. Then every potato is classified, damaged ones or those who have worms are separated for as food for the pigs. Those who are very big and selected as seeds, the rest is stored for consumption. Seeding of for instance oat is done by the mother of the family. She uses her skirt bag and puts seeds inside. Then she walks on the plot, takes some seeds in her right hand and throw the seeds while moving her arm in a circle. She does this my walking in rows with a distance of three meters. By this method about 70 seeds are placed on the soil. Afterwards, by using the hoe the soil is turned and the seeds covered with soil.

Climate variability

Concerning climate variability, also in this community people report a change during the last 20 years while strong effects are more recognizable since 5 years. Problems include higher wind speed, droughts, heavy rainfalls, diseases and hail. There is more risk of erosion which is managed by continuing the practices of building tresses. Droughts cause significant lower production of faba beans and potatoes. By using organic manure and trees, humidity level is tried to keep high. Biol and chemicals are used to manage pests and diseases in plants, especially potatoes are affected by diseases. Biol is known also in Yanahurko, the method was introduced by NGOs. Different local available ingredients are mixed. The recipe varies; the one in Basquitay is different to the one from Yanahurko. While in the latter not ingredients, except for fruits have to be bought, in the case of Basquitay minerals are needed which are expensive.

To deal with water shortage, water is tried to be collected in small basins which has very limited effect on water availability. Recently the man of the family bought stones to build a more sophisticated water collection basin collecting water from the roof of the family house.

The infrastructure is vulnerable to increasing weather extremes. After a heavy storm with wind, the electricity in the community broke down. It took about one week to repair the damage. During this time, the family stopped fieldwork earlier to cook when there still was light.

Terraces

In Basquitay a major problem is erosion as like in Yanahurko since recently more heavy rainfalls occur. To conserve the soil, the man of the family started the construction of terraces on his plots about 15 years ago. During this time, working for an NGO, the man of the family went to Honduras about 15 years ago. He was fascinated by the terraces he observed there. The terraces prevent erosion and by this conserve the fertile soil. In Ecuador there is a history of terraces introduced by the Incas. However, the terraces came from Central America where they were part of the very different cultural context of the Mayas. Looking further back in history, terraces in South America were first developed by Wari' people about 1000 CE in the rainforest what is today Brazil (Fash and Lyons, 2005).

Data from the focus plot

Soil overview

The plot has a the size of 0,2 ha, it is a relatively plane terrace. It is surrounded by trees which are mainly Eucalyptus trees. There are five different plants growing on the plot in intercropping; maize, potatoes, faba beans ullucus and mashua. Planting is done in rows with a distance of about 40cm .On the uphill side of the plot, the soil is snidely more wet than on the side facing downhill. This might be related to the shadow which is given by the terrace step uphill. While in the plot of Yanahurko no earthworms were found, in the plot here 6 worms were found in a whole of 40cmx 40cm with a depth of 30cm.

Production performance

Like in Yanahurko, the farmer observes a decline in production during the last years. This is considered to be related to the general use of a lot of pesticides and due to environmental change like droughts. Before, production of potatoes and faba beans used to be much higher. Because of the subsistent agriculture of the family, it was not possible to estimate production level. A number of plants is grown in intercropping, the family harvests the products when needed, for instance when planning to cook beans, beans would be harvested. The next day some potatoes might be harvested and some ullucus as the son living in the city comes along and his mother gives him some ullucus for cooking in the city. Another problem is that farmers indicate that yield fluctuate significant between the seasons.

Organic matter

Top soils in the community are about 50cm high and are significant lower in organic matter compared to Yanahurko. While in Yanahurko it was 12% which is very high on the focus plot in Basquitay it was 9,7% which is still very high compared to soils in Europe where a value higher than 2% is preferred.

As fertiliser for the pots, the manure of cows, sheep, chicken and guinea pigs are used. This is possible because animal have a fixed place where they stay. Cows are taken along during daily work and graze in the field margins. Next to the place where cows stay in the field, plants seem to be higher and productions better. Sheep are on pastures during the day. This method brings manure to the plots and pastures. The main fertilisation for the plots come from the manure gathered at the places where the animals stay. Here, it is gathered in bags and then

transported to the plot by donkeys and spread. Given the large number of 80 plots, there is a challenge in the question of when to apply the limited manure at which place. The theoretical strategy is to apply manure at those places where it is needed. According to the farmers, a need is given when the colour of the soil is too bright or when production is low. In fact, manure is often applied around the house where distance to the plot is low and manure can easily get rid of.

However, there is a second way of fertilisation. As mentioned, the family grows a lot of faba beans. The plant is a leguminous, it can fix nitrogen from the atmosphere. As mentioned, beans are intercropped with different other plants. Beans are often harvested in the field and plant residues are kept their, by this Nitrogen is supplied to the plants. The principle of nitrogen fixation is known by the farmer of the family who can tell about root nodules and interaction with the atmosphere. However, the women who actually work in the field do not know this.

In the case of fodder crops, the family grows alfalfa for the cows. Alfalfa is another leguminous plant and it has the advantage that it can be harvested many times.

Structure

Soil structure (Table 3) influences soil water infiltration and root growth. Often it is negatively influenced by the use of tractors. However, the plot is ploughed by hand. As a how typically reaches a depth of about 20 cm, this is represented in the resistant level of the soil. The upper layers are softer then the layers below 20 cm. Being a terrace, the topsoil is about one meter thick at the side downhill, while next to the step uphill, topsoil was only 20 cm. Sampling in the plot was done in the middle of the terrace, so have the way between the uphill and downhill step.

Soil depth	Resistance
0 - 15 cm	Very soft
15 – 25 cm	Soft
25 – 40 cm	Hard
Below 40 cm	Hard

Table 3 Soil structure in the top 40cm

Soil stability and water infiltration

Soil stability (see table 4) was measured by observe 16 top soil aggregates and watch their resistance to water. A good stability is and indicator for biological live and it is important to enable good infiltration, avoid soil crusting and by this it is important to avoid erosion. On a scale from 0 to 6, average soil stability is 5,6 which is very high, also compared to the cases of the other communities. The results are positive and show that the soil has a good ability to absorb water.

Water infiltration rates are high, in average an infiltration rate of 2,2 l/m2/h is possible. This reduces risk of erosion. However, after a heavy rain even, dramatic erosion occurred. The plot is a terrace and therefore, there is no slope.

Depth	Grouping	Aggregate size	Aggregate stability
0 -10 cm	Granual	Medium	Strong
10 – 20 cm	Granual	Medium	Strong
20 – 30 cm	Granual	Medium-Strong	Strong
30 – 40 cm	Blocky	Strong	Strong
40 – 50 cm	Blocky	Strong	Strong

Table 4 Soil stability

Nutrient availability

The pH of the soil is 5,9 which means it is acid and associated lower availability of nutrients for plants. Bacteria and fungi have various functions in the soil food web. Additional bacteria for instance convert the organic forms of nitrogen into ammonium. Due to the low pH in the soil, there is hardly any bacteria life possible. However, looking to Nitrate there is an availability of about 108kg/ha which is significant lower compared to Yanahurko (17okg/ha). With 0,8 g/cm3 bulk density is low but normal for Andosols soils. Andosols are volcanic ash soil. Low bulk density offers optimal root growth. Also here, a link to the manure application systems and by this to the bible and the NGO can be recognised.

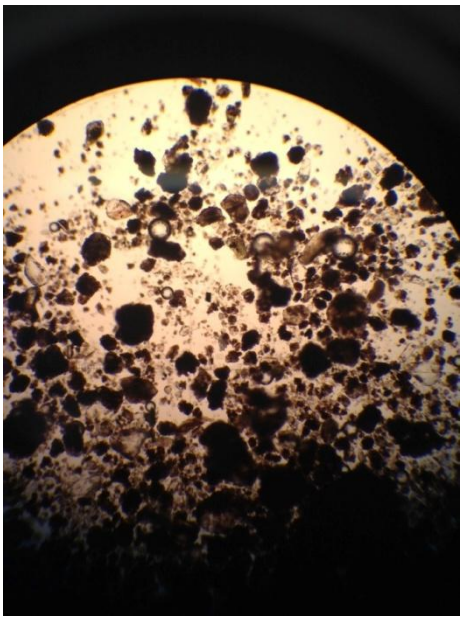


Figure 17 The soil of the plot under the microscope (40x zoomed)

Texture

The soil (Figure 17) of this plot consist of 11,0% particles which are smaller than 2µm, 59,8% between 2µm and 50 µm and 29,2 % which are between 50 µm and 1mm. This constellation is classified to be a silt loam.

Chapter 5. Characteristic of agricultural plots

Having presented the two cases, this chapter will answer the first research question; *What are characteristics of agricultural plots?* The question is meant to give a first overview on situation were fluidity can emerge. The concept to analyse these situations is intermingling. Intermingling was defined as feature of fluidity where a materiality can be part of multiple realities.

The plot of Yanahurko

The first plot is the one from Yanahurko. To recall, on this focus plot are growing Welsh onions. In the dark soil, around each plant there is a clump of guinea pig manure mixed with straw. Recently a heavy rain event caused dramatic erosion.

There are three characteristics of fluidity which can be found in the relation with the materiality of the plot. The first one is about the farmer being proud to produce organic. He applies guinea pig manure mixed with straw to the focus plot as organic fertiliser. Organic for him means to use no chemicals at all on the plot or apply them to his animals. Believing in god and being a pastor, he interprets the bible in the sense that in managing the soil as part of god's creation, therefore he must not use any chemicals. The guinea pig manure expresses the farmer's belief to god. On the other hand, the farmer is proud to work with a NGO. The NGO supports him in being organic and asks for a high 'hygiene standards'. Therefore the guinea pigs are treated with antibiotics and about once per week the stable of the animals is what the farmer calls disinfected. Being covered with protective cloth, the farmer sprays an acrid smelling chemical in the stable with special attention to the floor on the manure. Also here, the guinea pig manure expresses something, his proud of working with the NGO. Apparently, the same guinea pig manure seems to be part of two (contradicting) realities, one of god and one of the NGO. This multiple reality was defined as intermingling.

Looking into another example, the Welsh onions on the focus plot mean independence and social capital to the farmer. He was the first person in the community who planted Welsh onions, which is today widely adapted in his community. He is a person who likes to tackle problems. The market price for the Welsh onions from the focus plot is decreasing. The farmer therefore is searching for better ways to sell his onions but also the onions of his community members. He recently indicated a network to sell onions as seedlings which offers a higher income. By this he further builds his social network. In contrast to these notions of independence,

the focus plot is essential for his project with the NGO. The NGO wants him to have more guinea pigs. This means he needs more fodder grasses, to cut those the NGO donated a brush cutter to him. In fact they want him to grow more fodder crops which would mean he has to turn plots from Welsh onion to a plot with guinea pig grasses. Also here, intermingling can be found, the plot exists as expression for independence and at the same time as factor in the work with the NGO. This means a lack of clarity about what the meaning, the reality of the plot is.

The third example is about the materiality of the soil. As indicated, the farmer interprets the bible in the sense that he has to produce organic. The bible also tells him that he has to maintain the quality of the soil. He refers to the plots of other people by telling that they are not following the bible as their plots are eroded and getting brighter in colour. At the same time, there was heavy erosion in the focus plot caused by a rain event. The farmer noticed it but did not act immediately but a few days later when the erosion was even more dramatic. Only then he took action to repair the soil. So also here, the situation seems to be inconsistent. The farmer is highly concerned about maintaining the soil but heavy erosion seems to be not an urgent issue. In this case there seem to be more than one reality, one close relation of god and soil and one where the soil is left on his own.

The plot of Basquitay

To recall, on the focus plot in Basquitay five different crops grow in intercropping. The plot is a terrace and is surrounded by trees. Fertility of the soil appears to be high.

The man of the family (not the farmer) is advocating agroecological farming techniques. He rejects Western techniques and sees agroecology as an alternative which is part of the indigenous identity. By working for several NGOs he learned about different techniques. He thinks that trees have a positive effect on the focus plot. A main motivation is that trees can reduce wind speed and by this create a microclimate were humidity is maintained. There were different trees surrounding the plot. Between the farmer (the woman of the family) and her husband is an underlying pressure about the man's NGO influenced ideas about farming and the woman's practical ideas about farming. For the woman the trees (Eucalyptus trees) are known to consume the water of the soil surrounding them. This is why the trees are not liked by some farmers. One day the woman of the family cut down all trees surrounding a plot and claiming that the wood is needed as firewood for cooking.

The trees in this case seem to have different realities, one of agroecology and theory, on the other side farming practices and a gender conflict. There is lack of clarity on the reality of the tree. The boundaries between the tree as agroecological component, the tree as water consumer and the tree as conflict seem to be blurred. The example of the tree is interesting as it is different to the ones from Yanahurko, here the different realities appear not within one person but between two persons. This is also the case in the next example

The farmer and her husband have different ideas about what soil colour can mean. The woman of the family observes the soil to determine the next crop on the plot. A certain bluish colour surrounding the roots of faba beans tells her that she should now plant potatoes. By this the crop rotation depends on the soil colour. For the man, soil colour means something different. He associates a dark soil colour with fertility which is a long-term goal for him. The different interpretations of the soil also here show intermingling. Like in the previous example, this appears between people and not like in the cases from Yanahurko within a person.

The third example is about the realities of agricultural terraces. The man of the family – the husband is proud to be a local indigenous person. By following a moon calendar he feels to be part of the Inca tradition. As part of this philosophy he incited that most of the plots, including the focus plot were turned into terraces. These terraces are also what the husband presents to visitors, including NGO employees and other farmers. In fact he is a politician for a local

indigenous party. However, the terraces are not local terraces constructed as part of the Inca culture. They are constructed as part of the Maya culture of Central America. This comes as he imported the idea of the terraces from Honduras. Being part of the Western NGO World Vision, he visited the country. This is how the terraces came to the community. In this case the terraces are part of the reality of the husband working for an international NGO. There is intermingling here, the terrace as a local tradition and the terrace as nonlocal agroecological technique.

Sub-conclusion

Chapter five was addressing the first research question; *What are characteristics of agricultural plots?* The examples show common phenomena of daily life. These phenomena are commonly disqualified in science as inconsistency or non-logical behaviour. The developed theoretical background enables a view beyond this thinking.

The given examples showed that intermingling in the focus plots. There are examples where intermingling appears within a person and where intermingling appears between two different people. What is common is an overlapping of realities. This overlapping was defined as multiples and is visualised in Figure 17. The following step is to analyse how these multiples are assembled.

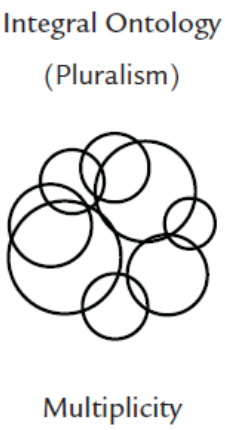


Figure 18 (Esbjörn-Hargens, 2010)

Chapter 6. The process of assembling as practice

It was concluded that there are overlapping realities in the plot. This paragraph addresses the second sub-research question; *How do humans and nonhumans construct practice by assembling?* To answer this question, the sub-question will be followed. First, it will be investigated how to characterise entities and territories in the plot. This will be followed by analysing power relations between the actors. Finally, the performance of the different assemblages will be discussed. Like in chapter five, the analysis will be done separately for the two focus plots, it will again be started with Yanahurko.

The plot of Yanahurko

Characterisation of fragments in the plot

This paragraph will answer the sub-question; *How to characterise fragments of the plot?* The two fragments to be addresses are entities and territories. Entities were defined as space claimed by nonhumans and characterised by internality and con-fusion. Territories were defined as space claimed by humans characterised by becoming.

Entities

To recall, on the focus plot Welsh onions are growing. In the dark soil, around each plant there is a clump of guinea pig manure mixed with straw. Recently a heavy rain event caused erosion. The material entities of soil, welsh onion, manure, straw and rain will be discussed by using the analytical concepts of infernality and con-fusion.

Soil colour

Being a volcanic ash soil (Andosol), its dark soil colour is related to the geological history of the region. However, another important factor is the history of the community. Looking back in history the soil had various functions, during Inca time there it was used as arable land until the Spanish conquered the area. Before the 2000s it was used as pasture. From then on it was used as arable land again. Welsh onion was planted and recently there was strong erosion. Organic matter content is very high in the topsoil which is related to the long-time of extensively used as pasture. Though, according to the farmer, the topsoil recently began to turn lighter. This was also seen in the colour of the deeper soil layer which appeared to be darker than the top layer which seems to slowly degrade. This is an example of internality; soil colour takes its previous identity as Inca

soil or pastures with it and con-fuses it with the current agricultural use, which causes a soil colour between dark and bright.

Welsh onion

Welsh onion grows on the plot constantly since twelve years. The Welsh onion can be tracked back to China where it is common since about 200 BC, it reached Japan about 500 AD and from here spread to South-East Asia and Europe. The plant was brought to Ecuador during the Spanish colonial time. It is in the area since 25 years, first as part of the Mestizos cattle breeders, later adapted by indigenous people. There was turn from a plant for home consumption to a commercial plant. Today it is sold on farmers markets where it has to fulfil certain quality standards. Thus, the plant was decontextualised, first from an Asian plant, then from the Mestizos and then it was recontextualised in the focus plot. This change the plant from an annual to a perianal plant, it changed planting distance, consumption and characteristics about notions of quality. Next to this con-fusion there is a certain fusion; plant maintained its visual notion of architecture and name. This shows that there is con-fusion and certain internality.

Manure

There is manure around every plant. The manure is applied to the soil in a certain amount at a certain location (in a hub around every plant). This application is a technique was used by the ancestors of the current farmer while they used cow manure. Manure changed after the introduction of guinea pigs in 2012. Guinea pigs are considered a traditional animal from the Andeans. However, until recently, they were not kept in huge amounts. When keeping 200 of them, like on the farm, chemical are used to perform hygiene. The manure most probably contains chemical residues which limit function as microorganisms die. The function of the manure expanded from fertilisation to giving humidity to the plant. Thus, while maintaining a certain identity, the manure in its materiality and function changed. Beside this internality, there is con-fusion, the manure was taken out of its context in the earlier way of integration with cows and put into the new context of integration with guinea pigs.

Straw

In the guinea pig manure, straw can be found. The straw is from the two family buildings with straw roofs, straw gets less every day. The farmer puts straw into the cages of the guinea pigs since especially small animals die from cold. He thinks that they suffer less when there is

straw. This is a nice example of taking the straw from its previous context, protecting the inner of a home from rain and cold, to a new context protecting small guinea pigs from cold. There is some internality but also a strong notion of con-fusion as the new context is very different from the old. When thinking of the soil as actually new context of the straw where it functions as organic matter, then the new straw almost lost its internality. Con-fusion is very strong here as the new identity of the straw is very different to previous context.

Rain

About 20 years ago, the entity of rain was structuring the planting cycle. Periods of drought and periods of rain where structuring growing periods. Currently these patterns disappeared. The function of giving water to the plant is maintained until today while today strong rainfall events and long periods of drought created a new identity (function) of the rain. It is used as example why chemicals are bad, according to farmers they cause the change in rain. Thus, also with the entity rain, there is internality, as some identity of it remained in the new context. Con-fusion appears as the earlier context of rain, structuring season, at least partly changed into one of rejecting modernity.

Sub-conclusion

Various entities were found in the plot. Entities will form part of a framework which will be developed as part of the analysis of the case studies (see Figure 19). They took notions of their old identities with them as part of a process of decontexualisation. During the process of recontexualisation in the new context, the old context is sticking to the entities which cause con-fusion. The straw which can be found in the soil is a small but interesting example, from a roof it became part of a new agroecological manure. By this, it was shown that an entity can have more than one identity. This makes the entity a multiple one by being part of different social constructions. These constructions were introduced as territories and will be discussed in the following paragraph.

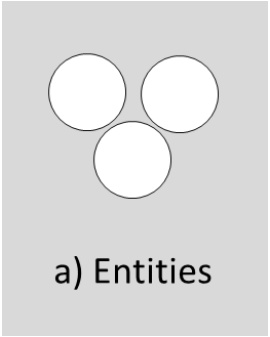


Figure 19 Entities as they will be represented in a framework

Territories

Territories claim human spaces by expressing a character, while entities claim material space. Having introduced the entities of the plot in Yanahurko, in the following territories will be presented which claim a space. The characterisation of territories is abstracter as they are less

visible compared to material entities, there for a short overview on how they will be approached is given. First, the territory will be given a name of a space it is claiming. When introducing the concept, the example of the territory of home was given, similar to this the territories which will be discussed are named god's kingdom, individuality and chemical. After having described the meanings of the name, the space they claim by sketching a triangle by lines of three key concepts. This process was introduced in chapter 2 and is meant to show the space of tension the territory claims. Finally, the dynamics of the territories will be analysed be the use of the concept becoming.

God's kingdom

God's kingdom is a space claiming tuning in with god. The name for the territory was inspired by the farmer's way of describing the role of god in the plot. For the farmer, the plot is part of creation of god while humans are administrators. This puts a certain respect to the materiality which needs to be constantly maintained. The three lines to scratch this territory (Figure 20) referred to as indication, interaction and incorporation. Indication is about notions of god which are indicated in materialities. A bright soil colour for instance refers to a farmer with less fear of god compared to a farmer with a dark soil. This shows a certain distance between the farmer and the plot, god is in between the plot and the farmer. Communication with the plot means a communication with god. Interaction refers to fear of god as basis for a good production. When a farmer takes care of his soil as god's creation, god will give a god harvest. Incorporation refers to claim of induration of god in the plot. The god's kingdom for instance claims that no pesticides should be used. Therefore, welsh onion is planted as it does not need chemicals.

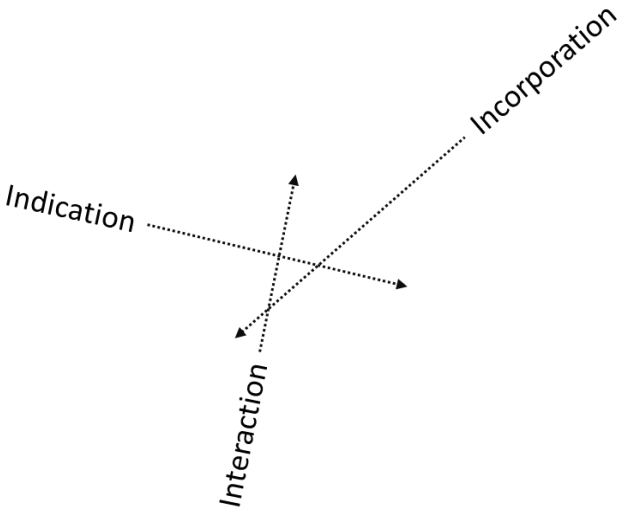


Figure 20 The territory of god's kingdom

The territory of Gods kingdom might become more stable in the plot. This can be the case when the farmer continues adding Guinea pig manure to the soil. The farmer thinks that this can stabilise soil colour and can prevent it from coming light. This effect is slow and will take many

years before becoming visible. This shows that there is a certain notion of reterritorialisation in the plot. At the same time the territory might become unstable in the plot, as depletion of the soil continues. This might be due to erosion or due to decreasing colour of the soil as not enough manure can be added. Digging into the soil showed that soil colour is lighter in the upper 40 cm of the soil compared to the lays under it. So also deterritorialisation is a characteristic of the plot. This means that the plot appears to be in constant process of becoming without predefined goal or direction.

Individuality

The farmer is known for his individuality. He was for instance the first person in the community who planted Welsh onion. Furthermore, he went to the city to become an (evangelic) pastor coming from a catholic community. He is a person who likes to tackle problems. The market price for the Welsh onions from the focus plot is decreasing. The farmer therefore is searching for better ways to sell his onion. The three lines to sketch this territory (Figure 21) are to create, independent and self-determined. Self-determination claims space of taking own decisions which might be also related to the time the farmer worked for the cattle breeders under conditions he describes as slavery. This gives a strong will to create the own environment by implementing own ideas, to be independent. This includes the shift from cow to guinea pig manure or the shift to Welsh onion instead of potatoes. The farmer has a frequent saying: "Nada es dificil" (Spanish for "nothing is difficult"). The farmer does not like to talk about challenges, like low production of plants or unpredictable market prices, as problems. He likes to talk about how to address these issues.

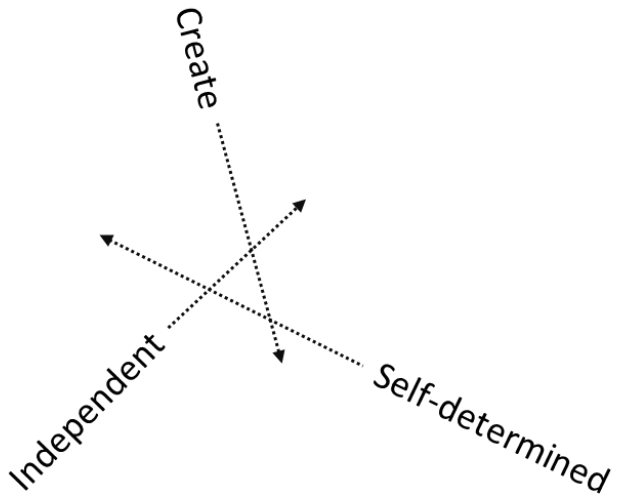


Figure 21 The territory of individuality

Individuality as territory might become more stable in the plot in performing the trees for instance. The farmer thinks about planting trees around the plot to protect the plot from erosion due to wind and rain. This might give another notion of individuality to plot and by this stabilise

individuality here, which would feed a reterritorialisation. On the other side the territory might become unstable. This might come due to the work with the NGO FEPP. Coming for visits, the NGO employee appears to be dominant in telling how things need to be done or not. There is resistance to this (see compost performance) but the farmer also adapts the advises and by this the territory of individuality is challenged and becoming unstable. An example is the use of chemicals in the guinea pig stable which comes due to the pressure for hygiene by the NGO. So it is also possible that there is a deterritorialisation. Both characteristics are given to be able to argue that this territory is in a process of becoming.

Chemical

Chemical is a territory claims a space of passive emergence. For the farmer, chemicals are the reason of a lot of problems which he cannot change. Chemicals are rather a symbol here, a symbol of the being present of something which cannot be seen. It is something abstract causing erosion in the plot or drop in market prices. This notion is shared by the other farmers and chemicals are a common way to paraphrase this space. The three lines to scratch this territory (Figure 22) refer to unchangeable, unexpected and uncertain. Unchangeable describes a notion of impotence to deal with events like erosion, depletion or hail damage, being the result of the chemical space. It is a space of a certain depression and sets certain limits to the territory of 'Individuality'. This goes also in the line of the unexpected, here sudden drops of market price for welsh onion can occur. Uncertainty is created as previous stable structures seem to dissolve.

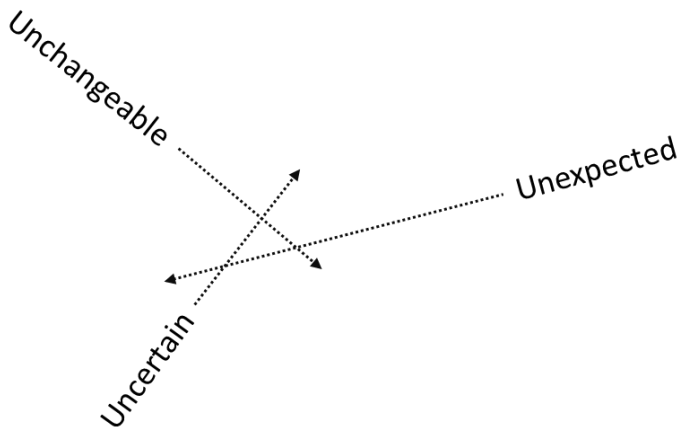


Figure 22 The territory of chemical

Chemical as territory might become more stable as their influence increases. Droughts, floods, hail and chemical use increase during the last 20 years and the problem are perceived to increase since about five years. The farmer expects the situation to become worse. This will stabilise this territory and cause a reterritorialisation. On the other side the territory might become fluid as the farmer starts to consider it not as external and unchangeable anymore but as being

related to his practice. Already today, the farmer is critical towards the farmers as managers of the soil, he says that farmers assume that the soil remains stable but then the rain comes very intense. The farmer thinks that it is also his fault that he allows the water to dick into his plot. So by creating small channels for drainage this can be prevented according to him. Certainly there is a change as the farmer gets from a passive role of having to deal with external change, to one where he becomes active in creating his environment indicating a deterritorialisation. Taken together, also this territory is in becoming.

Sub- conclusion

Various territories were found in the plot. Territories will form part of a framework which will be developed as part of the analysis of the case studies (see Figure 23). The characterisation of the territories showed how they occupy certain social space where they determine the meaning of things. There are constant processes of re- and deterritorialisation which means that the territories are in a constant process of becoming. Especially in the chemical territory becoming is highly interesting as it is possible that the farmer resigns facing environmental change, or he becomes active and emancipates from the feeling of passiveness.

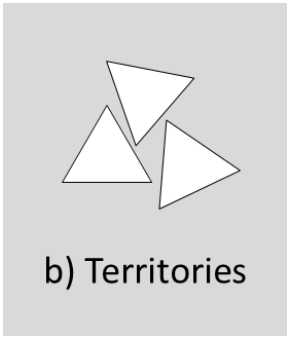


Figure 23 Territories as they will be represented in a framework

It is important here that territories are always linked to entities. Together they form assemblages as part of a mobilisation process, this will be discussed in the following.

Power relations in constructing assemblages

This paragraph will show how entities and territories interact in a process of mobilisation. This process of power was defined as the ability of an entity to relate to a territory or vice versa. By analysing this relation, this paragraph will answer the sub-research question of; *How do relations of power construct assemblages?* The wholes formed by these relations of power are assemblages. Assemblages were defined as fragment of a multiple reality formed by entities and territories.

Power in performing soil colour

The first assemblage performs soil colour. The important actors in this assemblage are the dark soil as entity and God's kingdom as territory. They interrelate in the by the three keywords

of interaction, indication and incorporation. When the farmer observes an agricultural plot, he can tell about the plots relation to god by referring to soil colour, so the soil as the capacity to mobilise god. It drives the farmer to a certain management of his soil, using for instance no pesticides. This shows the interaction the soil with the human. Thus, to be a good farmer, he has to incorporate the soil colour as guiding principle into his practice. So power here goes mutual, the soil mobilises the farmer and vice versa.

Power in performing manure

This assemblage performs manure. The important actors in this assemblage are the manure and straw as entities and the individuality as territory. They interact in the territory by independence, self-determination and creating. Independence the feeling of the farmer that he can act like he wants to act, this includes to change from com to guinea pig manure. Self-determination is taking independence further. It is the ability to determine change. This determination however is not exclusively the one of deciding but also to create openness fur outside input. This is specified here, creating is a notion of being active in creating by the farmer but it is also an openness to let the material create itself and follow it. For instance, the combination of straw and guinea pig manure do give humidity to the plant in times of drought. The farmer observed this and took it as reason for further pushing individuality. The idea is to offer a space where the material can talk back. So what it means to be a good farmer, the human capacity to mobilise a space. This space however is one where materialities are given a space for mobilising the human. This gives both, the human and the nonhuman the capacity to mobilise, thus power.

Power in performing erosion

This assemblage performs erosion. The important actors in this assemblage are the soil, the rain as entities and the chemical territory. They interact in the territory by unexpected, to be unchangeable and uncertainty. Material change like erosion occurs as unexpected events, the farmer says that he did not expect heavy rain after a long period of drought so he was not prepared. The situation the material change causes is unchangeable, like the erosion of about 8,5 m3 of soil within one day shows. This creates uncertainty as people do not know what the soil will look like next week. The material has in fact the power to change what it means to be a good farmer. As was shown, it changes social organisations and working tasks and contributes to a

perception of realities as being uncertain. Thus, in this assemblage mobilisation comes from the material side, nonhumans have huge power

Sub-conclusion

It was shown how different power relations between humans and nonhumans bring together certain entities and territories. Here, power relations are often mixed and sometimes nonhumans have more power compared to humans. This means that the classical separation of subject and object does not apply here. Also, humans can be objects of power by nonhumans. Erosion is a very common example in science as a problem which requires people to act, however it is never acknowledged that this means a significant power by nonhumans.

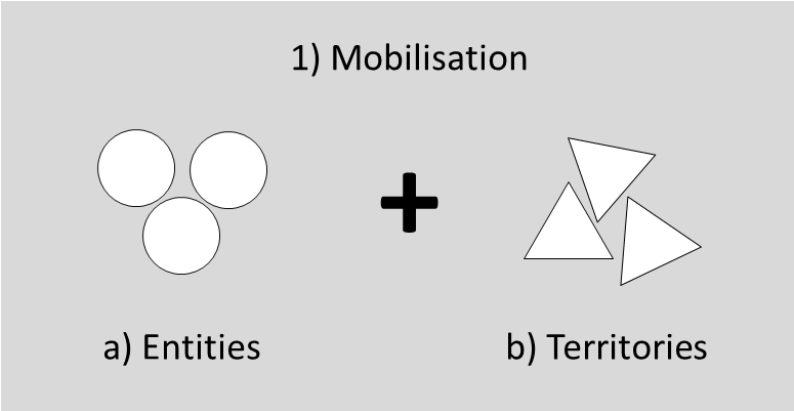


Figure 24 Mobilisation like it will be represented in a framework

Before, entities and territories were introduced as part of the plot, this paragraph addressed the question how they interact in the plot. Power to mobilise was a central process in the given examples. In developing a framework, this means mobilisation (see Figure 24) is the central process in governing entities and territories. At the same time assemblages were introduced, they will be part of the framework as sticking together of entities and territories, see Figure 25.

Figure 25 An assemblage like it will be represented in the framework

Having shown how mobilisation as practice is organised, in the following it will be shown what is performed, what assemblages can do.

Performance of assemblages in the plot

The following paragraph will show what the three assemblages can do by focusing on what they perform. By this the last sub-research question can be answered; *How are different assemblages performed in the plot?* This question addresses the question what an assemblage can do.

Performing soil colour

The first assemblage is a combination of the entities of soil colour and God's empire as territory. By the performance of soil colour, the assemblage can define what the abstract notion of god is. This is highly relevant for the farmer and might also be a reason why he did not finish the course to become a priest. The course is in the city and to follow it, the farmer needs to live in the city. This would however mean a distance to the soil and by this a distance to god. So next to defining what good is, the assemblage can define what it means to be a good farmer. The farmer names Guatemala where people do not study the bible and by this the soils was destroyed. This is why people suffer from hunger in Guatemala. Thus, to be a good farmer, in the first place the bible has to be studied which will lead farmers to a good conservation of their soils. This is the basis for a good agricultural production.

Next to this close distance, the assemblage creates distance to the plot. The soil is accepted to have its own dynamic (as being god) and as long as the farmer has fulfilled his tasks in treading the soil well. This means that erosion for instance is not a problem in this sense as it is part of the dynamic of god's creation which cannot be changed.

Performing manure

The second assemblage is a combination of the entities of straw and manure and the territory of individuality, together they can define what individuality is. Having indicated this way of agriculture, he is one of the three farmers in the community who grows organic Welsh onions by using guinea pig manure. So the guinea pig manure in the soil performs this individuality which distinguishes him from the huge group of farmers growing potatoes of Welsh onion with cow manure.

Individuality is highly relevant for the farmer. The farmer was always a person who found his own, individual way. He grew up without a father and studied to become an evangelic pastor coming from a catholic community. Today he is a pastor and farmer. Being a priest, people show respect and recognition towards him. However, it also puts him in special position in the community which means a certain distance. He is excluded from the hidden drinking gatherings which are considered to be non-religious. People come to address him when they need help, like an old widow receiving food from him. So there is a certain line of individuality which is constant in the farmers live. Concerning agriculture, the farmer wants to produce without chemicals as the bible taught him, which is not possible with potatoes but with Welsh onions as

he says. There is however more than the religious motivation for this choice. It is this constant curiosity to go individual ways which is driving him here. He started commercially planting Welsh onions as one of the first in his community, before he got a pastor and before he found out about the bibles guidelines on pesticides. This line of individuality is also why he as the first of his community started working with the NGO FEPP which offered him a lot of resources. He started to breed onions and to exchange manure practice in the onions from cow to guinea pig manure (mixed with straw).

So the constant thriving for individuality has implications for what it means to be a good farmer. It defines that a good farmer is the one who goes individual ways. On this track there is a strong notion of being open to take what comes. In the case of the plot it was the guinea pig manure offered by the NGO FEPP as part of the agroecology idea they brought. There is a certain saying of the farmer; "Nothing is difficult". It claims the space of individuality where new things are not only "not difficult" but the farmer uses the saying with a certain excitement. Individuality is not only an approach to react to change but to create it. This means the plot for the farmer is never static but in a constant search for performing individuality. An interesting point is the straw, as it is needed to keep the guinea pigs alive when it is cold. As the straw comes from the roof of one of the houses with straw roofs, individuality in this case means to slowly demolish these buildings.

Performing erosion

The second assemblage is a combination of the entities of soil and rain and the territory of chemical, together they can define what chemical mean. It can be used to make sense of decreasing yields, of diseases and erosion. Furthermore, it can indicate who is indigenous and how is destroying the earth, who is the outsider. This sets a boundary between identities which are increasingly difficult to hold apart, identities of being indigenous, being white, being Ecuadorian or being traditional. Furthermore, this assemblage can be used to mobilise resources from external humans like NGOs. Because there is increasing contamination, climate change and disaster by them, there is a notion of victim which is used to ask for external support.

So next to defining what the abstract notion of chemical means, the assemblage can define what it means to be a good farmer. The focus here is on erosion by heavy rain events occurring since 20 years and intensifying since five years. During the event, the rain was prohibiting work in the field. As no farmer was working, friends and family came along at the farmer's house. In

the straw building a camp fire was made which was activated by burning plastic, rubbish and old wood. People came to sit around the fire. Also, some animals came, including cats and chicken who were coming to sit next to the fire as well. The atmosphere was happy and business plans on a selling network for guinea pig was discusses. A friend who wanted to start breeding got advice and the farmer gave him about five male and female animals to start. So in this case, being a good farmer means to use the time of heavy rain to gather and to re-enact social contacts.

Next to this there is a change in relation to the soil. After the rain stopped, the soil demanded action. The how was used to create new hubs around the plants which cover the roots and straight the plants again. Often the problem was from where to take the soil to cover the roots. A lot of soil was washed away so there was little left to fill the gaps. Next to this, the smaller furrows which were running downwards were removed and vertical barriers were created. This was done by filling the space between the plants to create vertical rows. However, there was one big furrow which could not be filled up again, it was left to ensure drainage for next time. Due to the rain leaves died. Almost every plant had two or three leaves which had to be removed, otherwise production would be low. Finally, those plants which were washed away had to be replanted. Next to the social change, there is also a different demand of the plot for practice. This means different working tasks and organisational forms to be a good farmer.

Sub- Conclusion

This paragraph addressed the question of what different assemblages can do, what they perform. It was shown how the different assemblages of soil colour, manure and erosion are

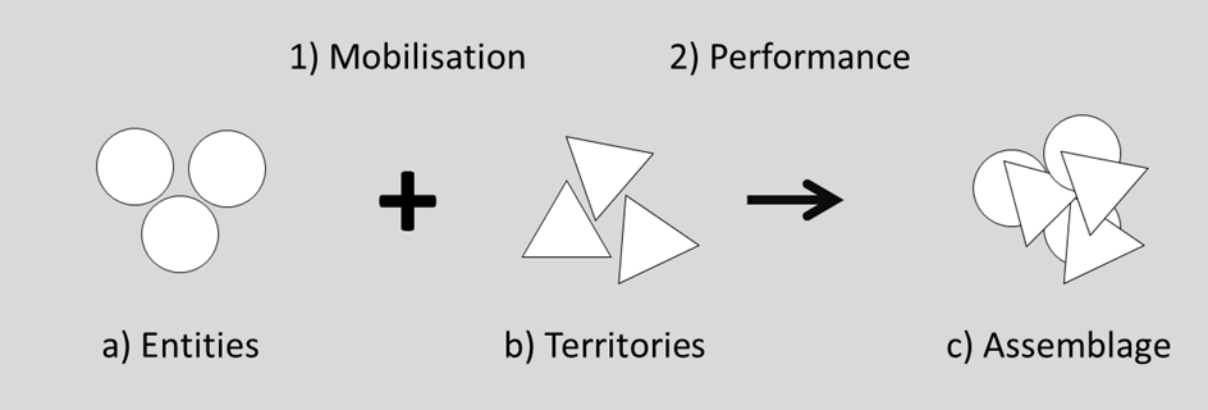


Figure 26 Performance of assemblages like visualised in the framework

performed in the plot. Performing takes place as connection of abstract notions to the materialities of the plot. This process means a certain way of performing practice. The logic in

these practices are very diverse and always the nonhuman actors are engaged in structuring it. The assemblage of performing soil colour might be most interesting here, as the notion of colour becomes something very central in life by its potential to connect to god. This is something very different compared to what soil colour might mean to soil scientists.

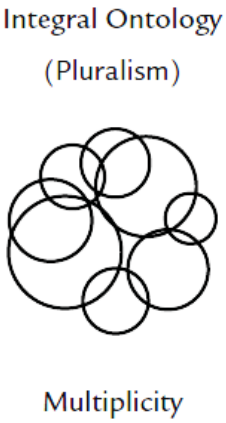


Figure 27 (Esbjörn-Hargens, 2010)

Performance added a last part of the framework (Figure 26). The framework now consist of three elements; entities, territories and assemblages. They are organised by two processes, mobilisation and performance. Together the framework shows a simplified way of how different realities are created. In the Figure by Esbjörn-Hargens (2010), Figure 27, this means the assemblage would be one circle among many. As entities and territories might be part of different assemblages, overlapping would emerge.

The plot of Basquitay

Having done the analysis for the focus plot from Yanahurko, in the following it will be focused on the plot of Basquitay. By this the framework will be tested in the analysis of this very different situation. The paragraph will answer the second research question, *how do humans and nonhumans construct practice by assembling?*

Characterisation of fragments in the plot

In this paragraph, characteristics of entities and territories will be presented, by answering the sub-research question; *How to characterise fragments of the plot?*

Entities

To recall, on the focus plot of Basquitay five different plants are growing. The plot is surrounded by trees and is flat terrace. The material entities of trees, soil and terraces will be discussed by using the analytical concepts of internality and con-fusion.

Trees

Trees are related to the past 30 years of community history. Most of the trees are Eucalyptus trees. During the colonial times, the trees are common to Australia but were taken out of this context and placed into an Ecuadorian one. Here, they are today used to build the ploughs

which are pulled by cows. This use as construction material reflects a certain internality. However, there are some changes, as in Australia the trees are avoided by farmers as they take up a lot of water from the soil which is then missing for plants. At the focus plot, the farmer knows this phenomenon but he thinks that they still reduce wind speed and by this conserve humidity on the plot. In this sense the tree change its identity from consuming water to facilitating water. This means there is notion of con-fusion, the old identity still exists but a new identity got dominating.

Soil

The soil has an important function in Basquitay. As in Yanahurko a dark soil is a sign for fertility. For the case Basquitay, the discussion goes however beyond its general dark colour. Here, the interesting point is the fact that the soil colour created by faba beans organises human behaviour. Faba bean is considered an old plant by the family. In fact it was brought via Mexico by the Spanish during the colonial time. Faba bean origins from the region of today's Iraq and Iran. In the literature the function of the faba bean is reduced to food. It is unclear if farmers in other regions make use of the colour the roots produce in order to structure agriculture. The function of food remains in the case which means a notion of internality, where the identity sticks to its previous context, while this is only part of today's identity of the bean. It is different to talk about con-fusion concerning colour the crop produces in the soil, as this act of faba beans seems to be unknown in the literature. Concerning the faba bean plant, there is con-fusion. In its region of origin, in Iran/Iraq it is an important winter crop. So, assuming there is no role concerning soil colour, there is a change of context which changed the crop from a function of food supply during winter to a function of structuring rotation of crops.

Terraces

Working for an NGO, the farmer went to Honduras about 15 years ago. He was fascinated by the terraces he observed there. The terraces prevent erosion and by this conserve the fertile soil. In Ecuador there is a history of terraces introduced by the Incas. However, the terraces came from Central America where they were part of the very different cultural context of the Mayas. Looking further back in history, terraces in South America were first developed by Wari' people about 1000 CE in the rainforest what is today Brazil (Fash and Lyons, 2005). So there is also here con-fusion, not only of taking terraces from the Honduras context to the Ecuador one but also taking terraces from the relatively flat lowland of the rainforest to the steep hills of the highland

of the Andes. At the same time there is a stickiness of the function of terraces of maintaining soil quality when there is risk of erosion. This shows a notion of internality.

Sub-conclusion

Various entities were characterised. Although the situation of the focus plot is very different, entities are present in Basquitay like they are in Yanahurko (Figure 28). It was shown that also in the case of Basquitay they took notions of their old identities with them as part of a process of decontexualisation. During the process of recontexualisation in the new context, the old context is sticking to the entities which cause con-fusion. By this, the entity can have more than one identity. This is especially interesting with soil colour the woman can observe which gives the soil a very active role in structuring practice. These constructions were introduced as territories and will be discussed in the following paragraph.

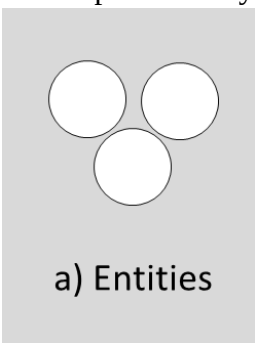


Figure 28 Entities like represented in the framework

Territories

Territories were discussed to claim human spaces by expressing a character, while entities claim material space. Having introduced the entities of the plot in Yanahurko, in the following territories will be presented which claim a space. Disengagement, natural energy and indigenous are territories which are going to be explored and analysed by looking into their stability.

Disengagement

Disengagement is a space claiming a space of intervention in the woman's space of agricultural practice. It is a social space which claims a territory in the mobilisation of trees. The name of the territory was used to describe a subtle but constant clash between the man and woman. For the woman, her way of farming is part of disengagement. By creating this distance she

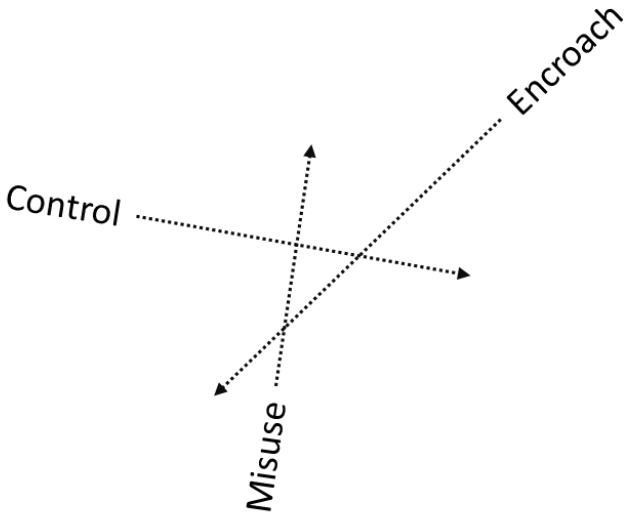


Figure 29 The territory of disengagement

creates certain autonomy for herself. The territory (Figure 29) is created by the three lines, control, encroach and misuse. Control is about the man controlling the woman's way of agricultural work. This is related to encroach, the man is for instance using the (anthroposophic) moon calendar to tell her what kind of work she should conduct every day, while he is away every day. Misuse is about the man using the agriculture of his wife for its purposes. He uses it to perform a certain kind of agriculture for people coming from outside like NGOs people. He presents himself as a "poor" farmer who follows agroecological principles. In fact his wife is farming and using pesticides.

The territory of disengagement might become more stable in the plot as the man in his function as community leader is bringing more people the farm to show them his idea of agroecology. By this reterritorialisation might occur as the woman would increasingly resist.

Disengagement might become unstable as territory, the woman is increasingly making visible the clash by cutting trees, or also by using pesticides. The moment might come when she will endanger the man's performance of agroecology to an extend which gets critical for the reputation of the man. Then the subtle conflict might become an open conflict. This shows a notion of deterritorialisation. So while there are both notions of getting stable and unstable, this means a certain state of in becoming.

Natural Energy

Natural energy is a space claiming the tuning in of the farmers practice with the colour around the roots of the faba bean. The territory (Figure 30) is scratched around the three lines of; indicate, determine and empower. To indicate refers to the materiality of the soil, which mobilises the territory to indicate certain will of a plant. The soil indicates that the next crop should be potatoes. The notion of indication is linked to a claim, it determines that the farmer should act, should plant potatoes next. However, there is also a certain notion of

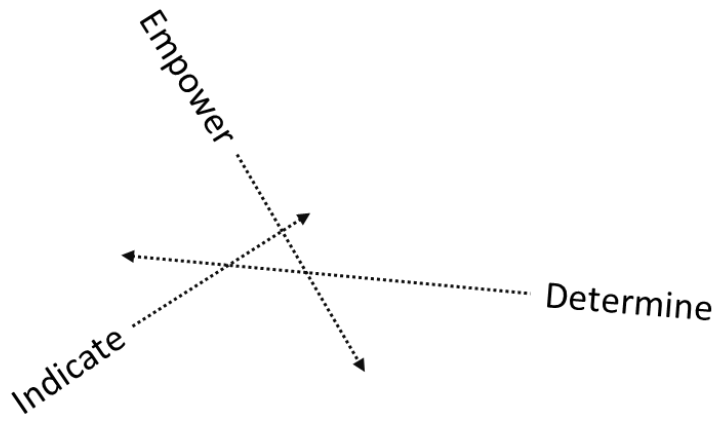


Figure 30 The territory of natural energy

empowering, the determination of the soil empowers the woman to act against the way the man is determining farming, in this case by determining a rotation scheme. The territory allows the woman to follow the soil and not the man. The territory is related to the territory of disengagement. However, while disengagement is rather a destructive, natural energy is a constructive way how humans and nonhumans organised the conflict.

The territory might get reterritoralised when the conflict between the territories of disengagement becomes more significant. Deterritorialisation might appear when the faba beans would not grow anymore. Because of drought, on some plots only certain maize varieties survive while faba beans do not. Therefore, faba beans and by this the territory might reduce in its importance.

Indigenous

The territory of indigenous claims a social space in the plot. The space claims a certain way to organise the materiality of the plot in terraces. There are three lines scratching this territory (Figure 31). It consists of a demand and notions to liberate and to sustain. Concerning to liberate, indigenous has a notion of freedom from the domination of modern agricultural practices like the use of chemicals. This connects to the notion of sustaining. To sustain refers to the soil and the old plants as part of the perception of indigenous culture. Finally, there is a demand a political claim for indigenous identity and right in a society which is sometimes racist and often considering indigenous as underdeveloped.

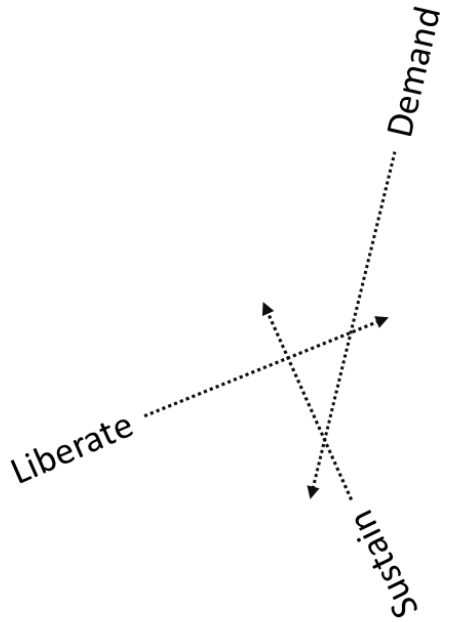


Figure 31 The territory of indigenous

The plot might be pushed further into the territory of indigenous. As the territory is interpreted as notion of resistance against modernity with its chemical inputs, this resistance might be increased if there are more modern techniques spread in the region. This would mean a reterritorialisation. The assemblage might become instable in the plot when the political significant decreases. The current sometimes racist distance between indigenous people and those people living in the cities might become less as there is increasing connection between city and

communities, for instance in direct marketing projects of agricultural goods. This would facilitate deterritorialisation in the plot. Also, this territory thus is in becoming.

Sub-conclusion

The characterisation of the territories showed how they occupy certain social space where they determine the meaning of things. Like in the case of Yanahurko, there are constant processes of re- and deterritorialisation which means that the territories are in a constant process of becoming. Disengagement is the most interesting territory here as it can give a significant meaning to the practice of the woman, the disengagement with her husband.

It can be confirmed that, like in Yanahurko, territories are present as spaces (Figure 32).

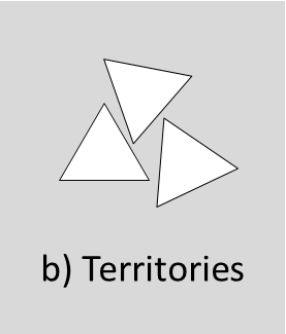


Figure 32 Territories like represented in the framework

Power relations in constructing assemblages

This paragraph will show the process of mobilisation (Figure 36) as process of power between humans and nonhuman. By this the paragraph will answer the sub-research question of; *How do relations of power construct assemblages?* It will be shown which territories and entities come together in assemblages and which actors are mobilising each other. In territories it will be referred to the three keywords like they were introduced above.

Power in performing trees

The first assemblage performs trees, its important actors are the trees as entities and the territory of disengagement. The territory is created by the three lines, control, encroach and misuse. By mobilising trees a certain way of being a good farmer is created. Control is the about the way the man the woman's way of agricultural work, by this a certain materiality, like the trees are mobilised by the man to be part of a good farming practice. This mobilisation is in fact a process of encroach in the practice of the woman. As part of misuse, the man mobilises a certain materialities to perform a certain agroecological role. So in all three case, the mobilisation went from the man to the materiality, therefore, in this territory the human is in the power position.

Power in performing soil colour

The second assemblage performs soil colour. The actors in performing soil colour are the soil as entity and the territory of natural energy, sketched by to indicate, to determine and to empower. Indication is the process where the soil colour around the faba bean roots mobilises the human to determine the following crop in the rotation, potatoes. As discussed above, by this way of offering an alternative way to determine rotation means an empowerment of the woman against the man. The territory allows the woman to follow the soil and not the man. In this sense the assemblage is a clear example of how a nonhuman actor mobilises a human territory.

Power in performing terraces

This assemblage performs terraces. The territory of indigenous comes together with the terrace. The territory is sketched by to liberate, demand and notions and to sustain. To liberate is a notion of freedom which the soil gives due to its relative stability, erosion does not occur. This is mobilised by the farmer to offer a perspective for the future. The soil is however asking for sustaining to keep this stability. When for instance working on the terrace, the hoeing is always started from the step of the terraces which goes uphill to the side which goes down. By this the terrace is kept levelled. In claiming an indigenous identity the terrace is mobilised by the human to perform a notion of agriculture which is better maintaining the soil compared to modern agriculture. So in this assemblage there is a mutual mobilisation of humans and nonhumans.

Sub-conclusion

It was shown how different power relations between humans and nonhumans bring together certain entities and territories. Here, power relations are often mixed and sometimes nonhumans have more power compared to humans. This means that the classical separation of subject and object does not apply here. Also, humans can be objects of power by nonhumans, this is

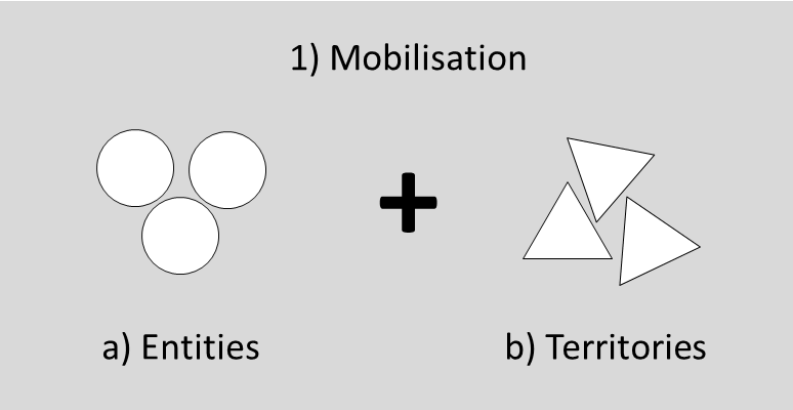


Figure 33 Mobilisation like represented in the framework

very direct when taking the case of the soil colour.

Like for the case of Yanahurko, entities and territories were introduced as part of the plot. This paragraph addressed the question how they interact in the plot. Also in Basquitay, mobilisation was a central process in the given examples. In developing a framework, this means mobilisation (see Figure 33) is the central process in governing entities and territories in Basquitay like it is in Yanahurko. At the same time assemblages were introduced, they will be part of the framework as sticking together of entities and territories, see Figure 34.

Figure 34 An assemblage like it will be represented in the framework

Having shown how mobilisation as practice is organised, in the following it will be shown what is performed, what assemblages can do.

Performance of assemblages in the plot

Having discussed fragments in the plot, the following paragraph will discuss how they collectively perform a role as being part of three different assemblages called, performing soil colour, performing manure and performing erosion. By this, the second sub-research question can be answered; *How are different assemblages performed in the plot?*

Performing trees

The first assemblage is a combination of the entity of the tree and the territory of disengagement. The assemblage can define what disengagement is, the trees become the materialisation of the abstract clashing. This is important for the woman who is the farmer in Basquitay. It is the man however who is presenting agriculture as his space, in fact he works in the city and comes only back during night and thus does hardly conduct any agricultural work. This leads to an underlying disengagement between the man and the woman. The woman does not know what the man is working and has hardly the possibility to get out of the community.

This notion of disengagement has influence on agricultural practice. One of the agricultural project of the farmer is that he asked her wife to plant trees. The trees have various agroecological functions for the farmer. He mentions increase in organic matter or protection from wind and sun. In fact trees asked heavy work from the woman, she needs to cut the wood and take it on her back to the house. The wife tells that trees are good to supply firewood for when she cooks. The conflict between man and woman in fact is performed via the trees. The man considers trees as part of his (political) project, he accepts that the woman sometimes might

cut a tree. The woman however takes actions where shed cuts all the trees surrounding a big plot (about 0,5 ha). Cutting and transport to the house takes several days. Cutting of the tree might be about agroecology or fire wood but it seems like trees are a performance of an underling clashing. The example of pesticide is another indication for this. The father claims that his family uses no pesticides at all which makes him very proud. His wife however applies pesticides several times per year. So in fact the assemblage can also define what it means to be a good farmer for the woman. Being a good farmer includes to perform the conflict between the couple.

Performing soil colour

The second assemblage is a combination of the soil as entity and the territory of natural energy. The assemblage can define what natural energy is. For the wife it is the about the way the faba bean communicates with her. When harvesting the dried beans, the woman pulls every bean plant out of the soil to harvest it. The soil breaks open and around the roots of the bean, there is a white or bluish colour in the soil. This colour means that the bean wants the farmer to plant potatoes. According to the man of the family who hardly works in the field, there is a rotation scheme which is followed. Here, the conflict from the previous assemblage comes back. However, the wife being the one conducting the work, follows the plant. Different to the tree example, the soil colour example can offer a way of engaging with the soil in a productive way. The territory allows the woman to follow the soil and not the man. By this it can define what it means to be a good farmer for her, by relating to the plants and the colour in the soil she designs an alternative logic for her agricultural practices. She creates an openness to be organised by the soil.

Performing terraces

The third assemblage is a combination of a terrace as entity and indigenous as territory. The farmer mixes his passion for agroecology and being indigenous. This means he considers terraces as part of his indigenous tradition or the moon calendar as part of the Inca culture. Agriculture by this becomes a performance (although he took the technique from a trip to Central America so from the Maya culture) of being indigenous. Being indigenous is relevant for the man. The man of the farmer worked for Western or Western financed NGOs since several decades. By this, he got to know the philosophy and techniques of the agroecology paradigm. This includes form him intercropping, terraces, the use of organic instead of chemical fertiliser and finally he took over the anthroposophic moon calendar. At the same time he is critical about

modern agricultural techniques and proud of his indigenous identity. Indigenous for him means to be different to modern agriculture next to the city that use green-houses and extensive pesticides. Indigenous also means to relate to planting potatoes of his ancestors (although they were sheep breeders). Indigenous finally is a political identity as he is a community leader and an engaged in an indigenous political party. By this the assemblage can define what it means to be a good farmer. The man defines his vision for the future to build more terraces. So in doing so he expands terraces and by this defines what a good farmer is.

Sub-conclusion

Like in the case of Yanahurko, performance added a last part of the framework (Figure 35). The framework now consist of three elements; entities, territories and assemblages. They are organised by two processes, mobilisation and performance. Together the framework shows a simplified way of how different realities are created.

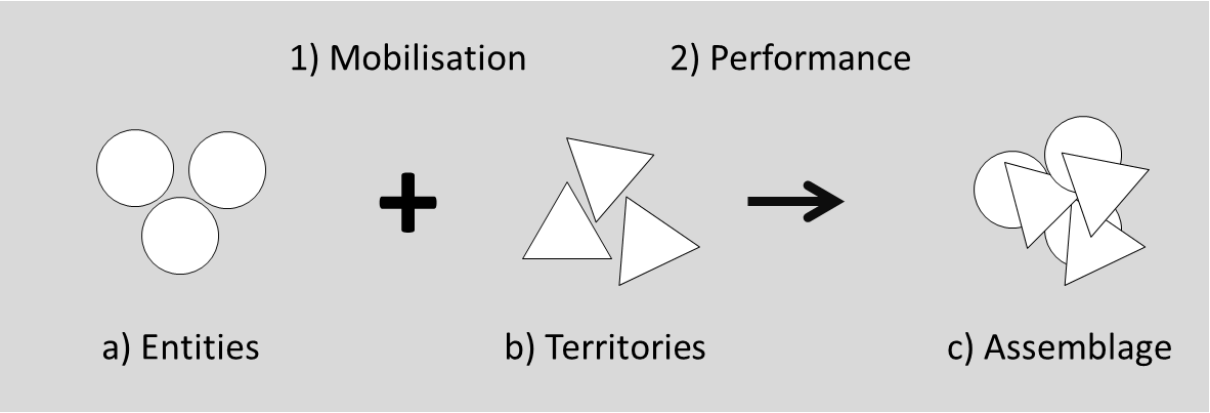


Figure 35 The framework developed from the field data

The two cases from Yanahurko and Basquitay showed that in both cases the framework can be found in realities on the ground. This makes it interesting to see if it can be used to explain fluidity like it was described in chapter five. This will be analysed in the following paragraph.

Chapter 7. The creation of fluidity by practice

This chapter goes back to the fluid situations found in chapter five. It will investigate, weather the developed framework from the previous chapter is useful to explain fluid situations. This will be done to answer sub-research question three; *How does practice create fluidity?*

The plot of Yanahurko

In chapter five, three characteristic of fluidity were explained. The first was about the farmer who is proud to produce without chemical but in fact he applies chemical contaminated manure to his plot. The analysis in chapter six showed that different territories overlap in the plot, God`s kingdom and individuality are engaged in the performance of soil colour and manure. The soil is overlapping here in two territories, one of God's kingdom and individuality of the other. This makes the entity of the soil multiple. There are two soils in one, intermingling can occur. This can explain fluid realities of the plot.

A second characteristic of fluidity was about the thriving for freedom and independence in planting onions while engaging with the NGO. The NGO controls the farmer and might push him to fodder crops. Here, the fluidity emerges as part of con-fusion, the farmer tries to take the manure out of the NGO context and place it in the territory of individuality. The manure as entity got stuck between two territories which cause a tension and appeared as fluid situation.

The third characteristic of fluidity appeared to be between the farmers concern about the maintenance of the soil as part of goods creation, while he keeps being passive after a rain event which caused tremendous erosion. This is another example of intermingling in the soil. The soil is part of the territories of God`s empire and the Chemical territory. Both claim the soil in performing assemblages. This makes the soil multiple and therefore the power engaged is multiple. While in Chemical territory the farmer plays a passive role, in the God`s empire he his active in maintaining the soil. The heavy rain event which caused the erosion is part of Chemical territory, therefore the farmer is mobilised in this territory and not in the God`s kingdom. This explains why the farmer in these specific situations remains passive while he in general is active in his care about the soil.

The plot of Basquitay

Also in the plot of Basquitay three cases of intermingling were found in chapter five. The first example was about the husband of the farmer being proud of trees and the farmer cutting them down. Here, the woman mobilise the trees to perform a conflict with her husband. The tree

as entity was taken out of the agroecological context of the man and mobilised in territory of disengagement. By this con-fusion the tree as an entity became multiple and turned from performing agroecology to performing a conflict.

A second example was about the interpretation of soil colour between the farmer and he husband. While the woman followed a certain soil colour in her practice, the man saw soil colour as result of his practice. In fact it shows that the same soil can have agency in the case of the woman and no agency in the case of the man. This causes intermingling in the soil.

A third characteristic of fluidity emerged around terraces being mobilised in the territory of indigenous and as part of an agroecological philosophy. In the one case there were local traditional, in the other case they were part of the NGO world and imported from another cultural tradition. This makes the terrace a multiple one and explains fluidity situations in the plot.

Sub-conclusion

This paragraph answered sub-research question three; *How does practice create fluidity?*It was shown how the insights about practices from the previous chapter could be used to explain fluid situations. This applies for two kinds of fluidity. In Yanahurko, fluidity emerged within one person, the farmer. In Basquitay some cases emerged between two persons, the farmer and her husband. In both cases, the interaction between entities and territories can explain these situations.

Part III. Discussion, Conclusion and Reflection

Chapter 8. Discussion, Conclusions and Recommendations

This chapter will discuss the findings of the research and draw conclusions. The main research question was; *How is fluidity created as practice between humans and nonhumans in agriculture of the Ecuadorian highland?*

A framework to explain the creation of fluidity

The research question was developed following three sub-research questions. Answering the first sub-research question, it was shown that there are multiple overlapping realities in agricultural plots. Answering the second sub-research question, it was shown how multities and territories create overlapping assemblages. A framework was developed to explain the process of creation of assemblages. The framework (Figure 37) describes assemblages as sticking together of entities and territories. Entities were identified as space claimed by materials while territories are spaces claimed by humans. The process of mobilisation governs the relation between the two. Territories can mobilise entities but also vice versa. This gives entities power over human territories which is different to common assumptions in positivistic theory. The second process is called performance. It is the process where assemblages come into being by the articulation of what they can do. Finally, by answering the third sub-research question, it was confirmed that the developed framework can explain the fluid realities found in the plot. By this it was described how fluidity was created as practice between humans and nonhumans in agriculture. By answering the research question, three objectives were intended to be addressed, a theoretical, a methodological and a practical one. In the following it will be reflected on the objectives.

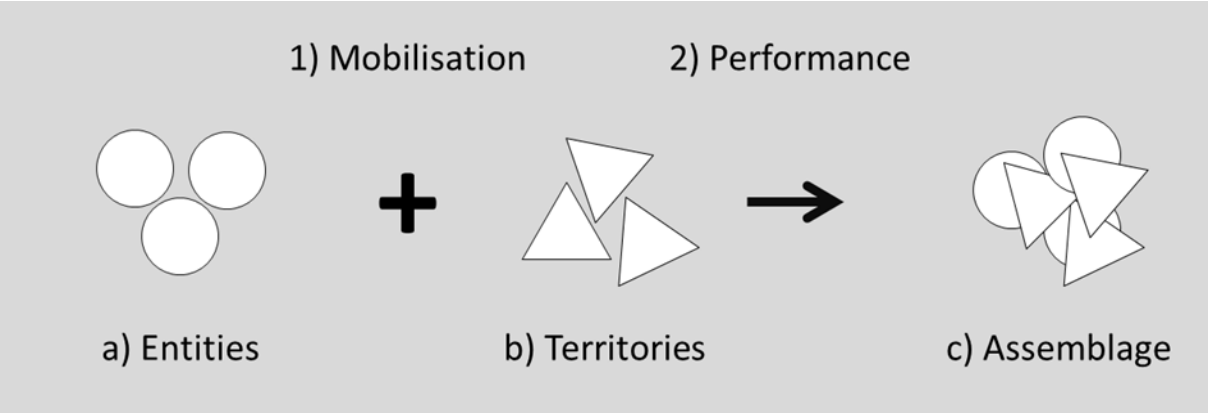


Figure 36 The framework developed from the field data

Theoretical conclusions

The theoretical level was the main focus of the research. The problem to be addressed was the gap between current positivistic approaches to reality and fluid situations on the ground. The fit-into-context approach was unable to relate to development situations on the ground.

Addressing this gap in Theory of Science, an alternative theory was developed which is based on three basic principles. The first principle is the **multiplication of realities.** This contrasts current dominant Modern Ontology with its positivistic thinking where one independent and pre-given reality is assumed. On the ground, entities and territories perform different realities at the same time. The second principle is the **end of objects**. Positivistic theories assume a subject versus object relation between humans and materialities. The thesis showed that on the ground, there are flat power relations. Humana and nonhuman actors mobilise each other and by this perform equal roles in the construction of realities. The third principle is the **becoming of structures**. Positivistic theory like systems thinking assumes a static reality with linear interactions. On the ground however, territories are in a constant and dynamic process of change. The state of realities is not a static one but one of constant bringing into being, of becoming. Relations between humans and nonhumans are constantly reorganised.

These principles can be used to crises Modern Ontology but they also need to be formulated into a fundamental different approach. Integral Ontology and the principles of this thesis show that first steps were made. However, further investigation is needed to develop a theory which can overcome positivistic thinking.

Methodological conclusions

On a methodological level, the thesis intended to integrate research methods from the classical natural and social science fields to understand human and nonhuman actors. The starting point was the material level. This appeared to be highly interesting to understand realities. The focus on the materialities was the key to understand overlapping realities. Here, it was experimented with research methods from the natural science. It appeared that there are two kinds of natural science knowledge, laboratory data and direct 'experiencal' data. The first kind of data needs translation, a human for instance cannot analyse pH in the soil. The analysis needs techniques which produce a number, for instance a pH of 5,7. This number needs to be translated to a certain insight in reality, for instance the pH is low and some crops therefore might produce less. This kind of data appeared to be less helpful in analysing fluid realities. The data seemed to be detached from the different realities of the plot, they appeared to exist in the laboratory and

not in the field. On the other side there is experiencal data which is data based on observations of materialities. This kind of natural science was highly valuable for the research. The different experiences of soil colour in Basquitay are an interesting example. Different realities were constructed by this soil colour while mobilising human territories. Thus, this shows the need for scientists to further explore the possibilities of expericencal data about material entities in helping to understand realities. However, as entities never appear without territories, future research needs to overcome classical division into natural and social science. Both fields are essential to make sense of realities. The natural science are experienced in 'listening' to entities, the social scientists are more experience in 'listening' to territories.

Practical conclusions

On a practical level the thesis intended to contribute to a new approach in development cooperation which goes beyond the *fit-into context* approach. Umans and Arce (2014) recently introduced an approach called "go-with-the-flow approach". They claim that, it opens the space for "development actors to escape the conceptual, mental or physical rigidities and to *go-with-the-flow*" (Umans and Arce, 2014: 343). The flow in this context would be one of fluidity. While first authors start thinking about a fundamental new approach to development intervention, this approach remains wake. It is unclear how such an approach could look like. Therefore, there is a need for further research to further develop the *go-with-the-flow* approach.

Chapter 9. Reflection on research process

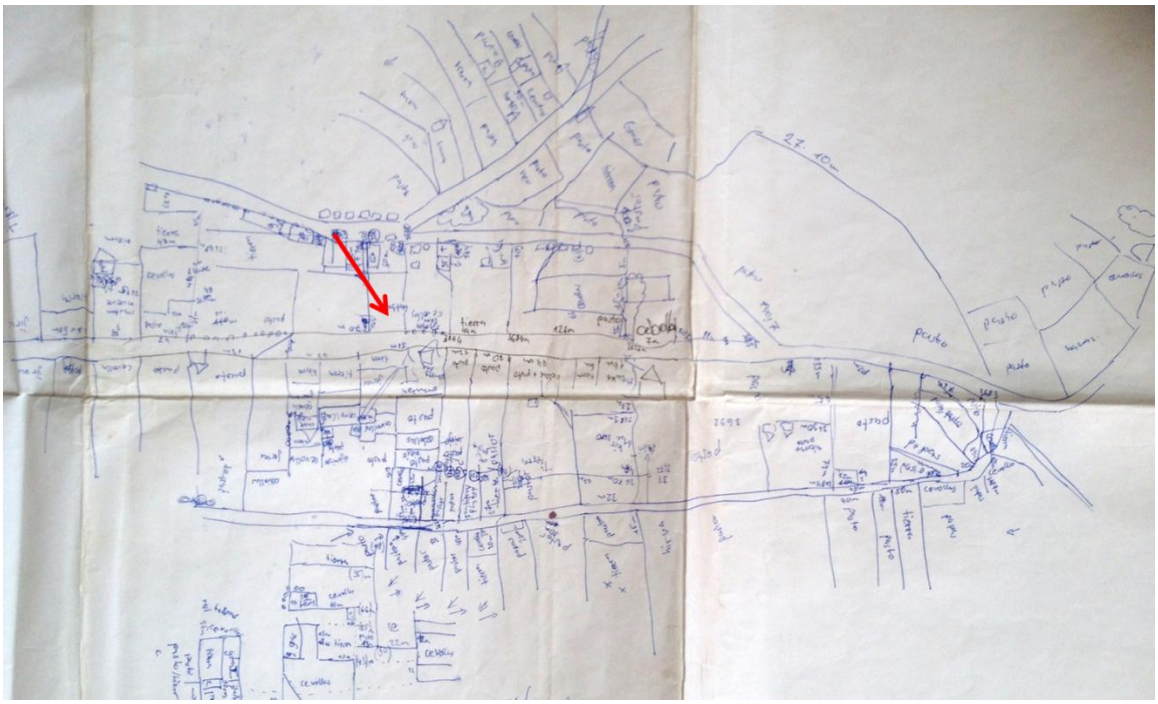
As last paragraph, I want to reflect on my personal research process. A professor of the Artez University in Arnhem once said that a thesis is a final exercise of a study program where the student creates a problem and then takes the challenge to solve it.

Concerning the first part of the exercise, the creation of a problem, I searched for a topic which was challenging me. The challenge for me needed to be on an abstract level, on a practical one and on a social one. By the choice for Theory of science I managed to find such a topic. It was challenging on the abstract level. I never worked on the topic before and literature, sometimes from philosophy, was challenging to read. On a practical level I succeeded as I managed to get to remote communities in Ecuador where I was able to stay for some month and gather meaningful data. This was possible because I got support from the right people, within and outside university. This was related to my last challenge, to build up a social network with people who support me in what I wanted to do.

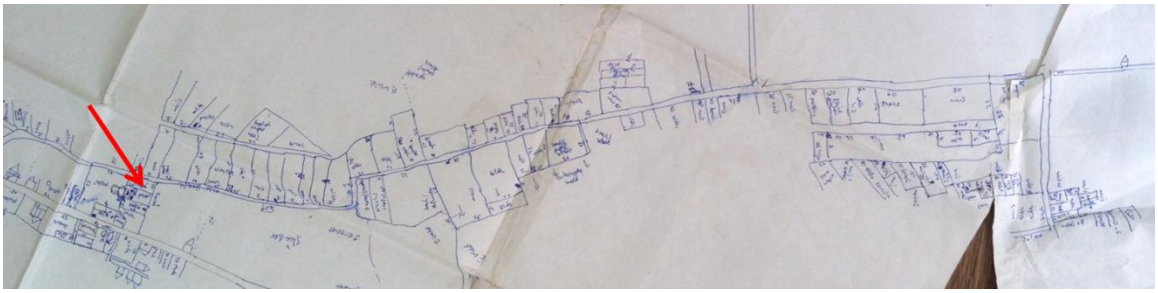
Concerning the second exercise, the solving of a problem, I was more challenged than I expected. Solving the problem for me meant to present insights into the topic in a dense and meaningful way. At the same time it should be easy to understand for the reader. Especially the part on an understandable presentation took me much longer than I expected and I am still not satisfied. Still, part of the readers will struggle in following the argumentation. Nevertheless, it was possible to offer the reader a critical alternative to make sense of realities. I like the topic and therefore, I would like to work on the topic after finishing my studies.

Appendix

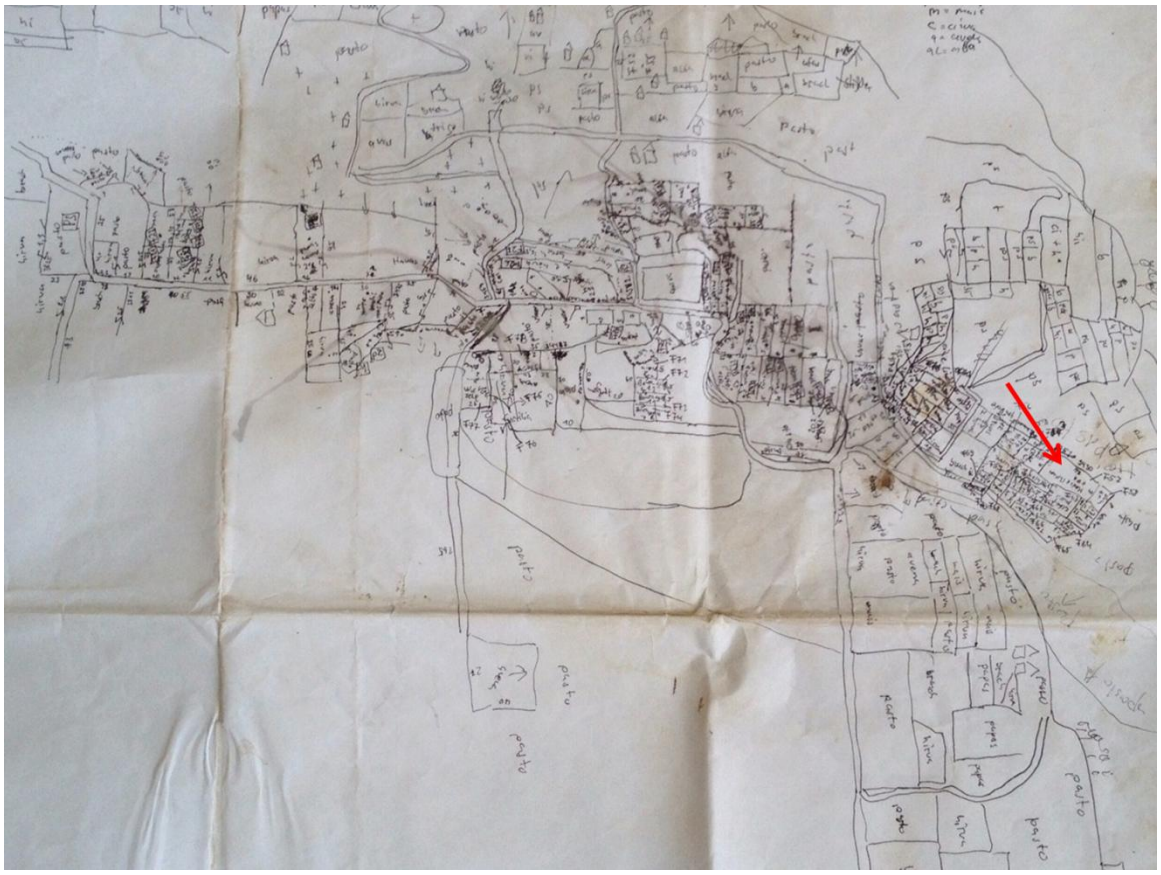
Appendix 1 Map of Yanahurko with focus plot indicated by red arrow



Appendix 2 Map of Tzimbuto with focus plot indicated by red arrow



Appendix 3 Map of Basquitay with focus plot indicated by red arrow



References

Adey, P. 2009. "Fluidity–Fixity," in *International encyclopedia of human geography*. Edited by R. Kitchin and N. Thrift, pp. 194-199. Oxford: Elsevier.

Arce, A., and N. Long. 2000. *Anthropology, development, and modernities: exploring discourses, counter-tendencies, and violence*: Psychology Press.

Assembly, U. G. 2000. United Nations millennium declaration. *resolution adopted* 18.

Bauman, Z. 2000. Liquid Modernity.

Becker, M. 2010. *Pachakutik: Indigenous movements and electoral politics in Ecuador*: Rowman & Littlefield Publishers.

Bennett, D. 2009. "Positivism/Positivist Geography," in *International encyclopedia of human geography*. Edited by R. Kitchin and N. Thrift, pp. 295-311. Oxford: Elsevier.

Bennett, J. 2005. The agency of assemblages and the North American blackout. *Public Culture* 17:445.

Benzi, R., and U. Frisch. 2010. Turbulence. *Scholarpedia* 5:3439.

Boelens, R. 2008. *The rules of the game and the game of the rules: Normalization and resistance in Andean water control*: Wageningen University Wageningen.

Boko, M., I. Niang, A. Nyong, C. Vogel, A. Githeko, M. Medany, B. Osman-Elasha, R. Tabo, and P. Yanda. 2007. Africa.

Booth, D. 1994. *Rethinking social development: theory, research and practice*: Longman Scientific & Technical Harlow, Essex.

Bryant, L. R. 2011. The democracy of objects.

Brives, C. 2013. Identifying ontologies on a clinical trial. *Social Studies of Science*.

Buttel, F. H., O. F. Larson, and G. W. Gillespie Jr. 1990. *The sociology of agriculture*: Greenwood Press, Inc.

Carolan, M. S. 2004. Ontological politics: mapping a complex environmental problem. *Environmental Values*:497-522.

Casley, D. J., K. Kumar, and B. Mundial. 1988. "Collection, analysis and use of monitoring and evaluation data," in *Collection, analysis and use of monitoring and evaluation data*: Johns Hopkins University Press.

Castree, N. 2001. Socializing nature: Theory, practice, and politics. *Social nature: Theory, practice, and politics*:1-21.

Crane, T. A., and B. Traore. 2005. Farmers' Knowledge and Perceptions of Soil Fertility. *Conflict, Social Capital, and Managing Natural Resources: A West African Case Study*:129.

De la Cadena, M. 2010. Indigenous cosmopolitics in the Andes: Conceptual reflections beyond "Politics". *Cultural Anthropology* 25:334-370.

Del Casino Jr, V. J., and D. Thien. 2009. "Symbolic Interactionism," in *International encyclopedia of human geography*. Edited by R. Kitchin and N. Thrift, pp. 132-137. Oxford: Elsevier.

DeLanda, M. 2006. *A new philosophy of society: Assemblage theory and social complexity*: Bloomsbury Publishing.

—. 2013. *Intensive science and virtual philosophy*: A&C Black.

Deleuze, G. 1990. *Expressionism in philosophy: Spinoza*: Mit Pr.

Deleuze, G., and F. Guattari. 1988. *A thousand plateaus: Capitalism and schizophrenia*: Bloomsbury Publishing.

Esbjörn-Hargens, S. 2010. An ontology of climate change. *Journal of Integral Theory and Practice* 5:143-174.

Escobar, A. 2006. Places and regions in the age of globality: Social movements and biodiversity conservation in the Colombian Pacific. *manuscript accepted for publication by Duke University Press, Durham, NC*.

Fash, W. L., and M. E. Lyons. 2005. *The Ancient American World*: Oxford University Press.

Fonte, S. J., S. J. Vanek, P. Oyarzun, S. Parsa, D. Carolina Quintero, I. M. Rao, and P. Lavelle. 2012. 4 Pathways to Agroecological Intensification of Soil Fertility Management by Smallholder Farmers in the Andean Highlands. *Advances in Agronomy* 116:125.

Foster, P. 2001. The potential negative impacts of global climate change on tropical montane cloud forests. *Earth-Science Reviews* 55:73-106.

Gibson, L., and G. Benson. 2002. Origin, history, and uses of oat (Avena sativa) and wheat (Triticum aestivum). *Iowa State University, Department of Agronomy, USA*.

Goffman, E. 1959. The presentation of self in everyday life.

Greenhough, B. 2009. "Social Studies of Scientific Knowledge," in *International encyclopedia of human geography*. Edited by R. Kitchin and N. Thrift, pp. 204-211. Oxford: Elsevier.

Ingold, T. 2009. "Point, line and counterpoint: From environment to fluid space," in *Neurobiology of "Umwelt"*, pp. 141-155: Springer.

Ison, R., P. Maiteny, and S. Carr. 1997. Systems methodologies for sustainable natural resources research and development. *Agricultural systems* 55:257-272.

Jensen, C. B., and K. Rodje. 2013. *Deleuzian intersections: Science, technology, anthropology*: Berghahn Books.

Jóhannesson, G. T., and J. O. Bærenholdt. 2009. "Actor-Network Theory/Network Geographies," in *International encyclopedia of human geography*. Edited by R. Kitchin and N. Thrift, pp. 15-19. Oxford: Elsevier.

Johnston, L. 2009. "Body, The," in *International encyclopedia of human geography*. Edited by R. Kitchin and N. Thrift, pp. 326-331. Oxford: Elsevier.

Jones, O. 2009. "Nature-Culture," in *International encyclopedia of human geography*. Edited by R. Kitchin and N. Thrift, pp. 309-323. Oxford: Elsevier.

Latour, B. 1991. *We have never been modern*: Harvard University Press.

Latour, B. 1992. "Where Are the Missing Masses? The Sociology of a Few Mundane Artifacts," in *Shaping Technology / Building Society: Studies in Sociotechnical Change*. Edited by W. E. Bijker and J. Law.

Lauderbaugh, G. 2012. *The History of Ecuador*: Greenwood.

Link, W., M. Hanafy, N. Malenica, S. Jelenić, and H.-J. Jacobsen. 2009. "Faba Bean," in *Compendium of Transgenic Crop Plants*: John Wiley & Sons, Ltd.

Long, N. 1989. Encounters at the interface: A perspective on social discontinuities in rural development.

Marcus, G. E., and E. Saka. 2006. Assemblage. *Theory, Culture & Society* 23:101-106.

McDowell, S. 2009. "Memory," in *International encyclopedia of human geography*. Edited by R. Kitchin and N. Thrift, pp. 59-63. Oxford: Elsevier.

Oliga, J. C. 1988. Methodological foundations of systems methodologies. *Systems Practice* 1:87-112.

Ong, A., and S. J. Collier. 2008. *Global assemblages: technology, politics, and ethics as anthropological problems*: John Wiley & Sons.

Oyen, L. P. A., and C.-M. Messiaen. 2004. " Allium fistulosum L," in *[Internet] Record from PROTA4U*, vol. 2014. Edited by R. H. M. J. Lemmens and L. P. A. Oyen, pp. Record from PROTA4U. Wageningen, Netherlands: PROTA (Plant Resources of Tropical Africa / Ressources végétales de l'Afrique tropicale).

Palmĺs, K. 2007. Deleuze and DeLanda: A new ontology, a new political economy?

Parr, A. 2010. *The Deleuze Dictionary*: Edinburgh University Press.

Perez, C., C. Nicklin, O. Dangles, S. Vanek, S. Sherwood, S. Halloy, K. Garrett, and G. Forbes. Climate Change in the High Andes: implications and adaptation strategies for small-scale farmers.

Rankin, K. N. 2008. Manufacturing rural finance in Asia: Institutional assemblages, market societies, entrepreneurial subjects. *Geoforum* 39:1965-1977.

Richards, P. 1989. Agriculture as a performance. *Farmer first: Farmer innovation and agricultural research*:39-51.

Roe, E. J. 2009. "Human-Nonhuman," in *International Encyclopedia of Human Geography*. Edited by R. Kitchin and N. Thrift, pp. 251-257. Oxford: Elsevier.

Rogers, E. M. 1962. *Diffusion of innovations*.

Sarma, R. B. 2009. "Feminist Political Economy," in *International encyclopedia of human geography*. Edited by R. Kitchin and N. Thrift, pp. 79-86. Oxford: Elsevier.

Schatz, H. 2007. "Bahia ballet," vol. 2014: visualize.us.

Sean, O. H. 2010. "Interview: Marina Abramović," in *The observer*, vol. 2014. London: The Guardian.

Sherwood, S., and J. Bentley. 2009. Katalysis: helping Andean farmers adapt to climate change. *Community-based adaptation to climate change*:65.

Smith, B. H., E. R. Weintraub, J. Law, and A. Mol. 2002. *Complexities: Social studies of knowledge practices*: Duke University Press.

Stivale, C. J. 2005. *Gilles Deleuze: Key Concepts*: McGill-Queen's University Press.

Suttie, J. M., and S. G. Reynolds. 2004. *Fodder oats: a world overview*: Food & Agriculture Org.

Talawar, S., and R. E. Rhoades. 1998. Scientific and local classification and management of soils. *Agriculture and Human Values* 15:3-14.

Tay, A. 2009. "Material, The," in *International encyclopedia of human geography*. Edited by R. Kitchin and N. Thrift, pp. 505-510. Oxford: Elsevier.

Thien, D. 2009. "Feminist Methodologies," in *International encyclopedia of human geography*. Edited by R. Kitchin and N. Thrift, pp. 71-78. Oxford: Elsevier.

Truman, H. S. 1949. *Inaugural Address: Thursday, January 20, 1949*.

Umans, L., and A. Arce. 2014. Fixing rural development cooperation? Not in situations involving blurring and fluidity. *Journal of Rural Studies* 34:337-344.

Urrutia, R., and M. Vuille. 2009. Climate change projections for the tropical Andes using a regional climate model: Temperature and precipitation simulations for the end of the 21st century. *J. Geophys. Res* 114:D02108.

USDA. 1999. *Soil Quality Test Kit Guide*: Washington, DC.

Viscarra Hansson, B. J., and J. Malmqvist. 2011. International Development Cooperation and Climate Change Adaptation in Kuyoj Qhocha, Bolivia-A Case Study of Resilience and Vulnerability Among Small-Scale Farmers.

Williams, J. 2000. Deleuze's ontology and creativity: Becoming in architecture. *Pli: The Warwick Journal of Philosophy* 9:200-219.

WinklerPrins, A. M., and J. A. Sandor. 2003. Local soil knowledge: insights, applications, and challenges. *Geoderma* 111:165-170.

Woodward, K., D. P. Dixon, and J. P. Jones Iii. 2009. "Poststructuralism/Poststructuralist Geographies," in *International Encyclopedia of Human Geography*. Edited by R. Kitchin and N. Thrift, pp. 396-407. Oxford: Elsevier.