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Project Narratives: Investigating Participatory Conservation in the Peruvian Andes

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ABSTRACT

This article shares findings from a participatory assessment study of a community-based environmental monitoring project in the Peruvian Andes. The objective of the project was to generate evidence to support sustainable livelihoods through participatory knowledge generation. With the use of narrative framing, the study retrospectively reconstructs the project's trajectory as perceived by the three stakeholder groups: the community, the researchers, and the implementing NGO. This analysis reveals discrepancies between the stakeholder groups both in their view of the course of events and their understanding of the purpose of the intervention. However, while the storylines depict differing project trajectories, they often agree in terms of long-term goals. The study also uncovers some neglected positive externalities that are of considerable significance to local stakeholders. These include community-to-community knowledge transfer, intergenerational knowledge sharing and ecosystem knowledge revival. The article illustrates how assumptions and expectations about participatory projects are encapsulated in narratives of positive change despite the limited level of agreement among stakeholders about what such a change should comprise. It sheds light on development narratives and their power to shape stakeholders' perceptions in accordance with their beliefs and priorities. This is of special importance for ecosystem governance projects, which are sensitive to normative differences and subject to competing claims.

INTRODUCTION: PARTICIPATION, PRIORITIES AND POWER IN MULTI-STAKEHOLDER PROJECTS

In the past few decades, expert-driven, prescriptive management of natural resources has given way to stakeholder-centred ecosystem governance (Menzel and Teng, 2010; Voinov et al., 2016; Woodhouse and Muller, 2017). Participatory approaches are believed to result in more inclusive and democratic forms of eco-regional development as they engage and empower local communities (Corbett and Keller, 2005; Young and Gilmore, 2017). Despite the positive discourse and increasing interest in stakeholder-driven projects, however, the impact of externally induced participation remains contested

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(Agrawal and Gibson, 1999; Campbell and Vainio-Mattila, 2003; Cleaver, 1999; Gaventa and Barret, 2010; Kumar and Corbridge, 2002; Mansuri and Rao, 2013; Rask, 2013; White et al., 2018). The principal criticisms point to the way in which participatory approaches homogenize local stakeholders, while power relations and social hierarchies are as unequal and as entrenched at the local level as they are within the general development industry. At the project level, participatory approaches tend to assume that inclusion translates into conflict-free consensus, whereas in practice, vital interests often do conflict (Makgamatha, 2008).

In the research presented in this article, we explore the implicit assumption of participatory design that links community engagement with the increased likelihood of project success in improving ecosystem knowledge and project governance (Mendoza and Prabhu, 2009). We show how assumptions and expectations about participatory projects are often encapsulated in narratives of positive change even when there is little or no agreement among the stakeholders about what such a change should comprise (Glover, 2010; Mosse, 2005; Roe, 1994). We take a recent participatory environmental monitoring project in Huamantanga (Peru) as a case study to draw attention to the diversity of perceptions and assumptions around the change induced by the intervention. By combining scientific modelling with participatory monitoring and broad information accessibility, Environmental Virtual Observatories (EVOs) are supposed to foster dialogue and exchange between users, development organizations, scientists, states and businesses (Cieslik et al., 2018; Karpouzoglou et al., 2016). The case study project, known as (Mountain-) Environmental Virtual Observatory (M-EVO), was designed as a prototype for a decentralized platform for ecosystem knowledge generation and exchange. As a 'research for development' project, M-EVO aimed to foster adaptive governance through the mechanisms of participatory knowledge co-creation by the local community and professional scientists.

Within this article, we map out the participants' perspectives on the purpose and impact of the project, as elicited at the end of the intervention. In particular, we compare and contrast the project's logics as experienced and assessed by three groups of stakeholders: the international team of researchers, the local community members, and the implementing NGO. Our analysis employs an inverted theory of change approach — a narrative framing tool that allows us to retrace the change process through retrospective personal accounts (Vogel, 2012). The purpose of our research is thus a structured multi-vocal assessment of the project that focuses both on the implementation activities (what has been done?) and the impacts (what has changed because of these activities?).

The benefits of involving multiple stakeholders' perspectives in project assessment have been described in the literature (Fetterman et al., 2014; Kapoor, 2001; Voinov et al., 2016). Research shows that impact assessment is especially complex in projects that focus on behavioural and

policy change. Such projects, M-EVO among them, tend to be subject to 'lag effects and multiple causalities' (Mendoza and Prabhu, 2009: 177–78). As such, their assessment is more prone to misinterpretation.

This research builds on the growing body of literature within the discipline of development studies that focuses on the *perceptions and interpretations* of events rather than the events themselves (Mosse, 2005). Often referred to as the framing perspective, this conceptual tradition examines the processes by which individuals, groups and societies organize, perceive and communicate about reality (Venot, 2016). We base our study on personal narratives, or stories, about the M-EVO project, collected from key stakeholders during the closing stage. Our analysis exposes important discrepancies between the stakeholder groups' accounts regarding not only the course of events, but also the very purpose of the intervention.

Our contribution is as follows: we reconstruct the project's trajectories in the form of collated scripts for each stakeholder group. We find that, while the narratives depict differing trajectories of the project, they often point to similar long-term goals. These results advance the theory and practice of participatory impact assessment, questioning the standard indicator-based approach and calling for a more reflexive and flexible use of assessment tools. In addition, we identify three distinct positive externalities that, although not assumed by the project, are of considerable significance to local stakeholders, and as such have the potential to boost the project's positive impacts. These include community-to-community knowledge transfer, inter-generational knowledge sharing and ecosystem knowledge revival.

The originality of our approach lies in recognizing the power of narratives to shape stakeholders' perceptions in accordance with their assumptions and expectations. We show how narratives allow the stakeholders to manage the ambiguity and uncertainty of the complex 'project reality'. In so doing, we refine and extend our understanding of sense making in the context of a community-driven natural conservation project. There is a growing strand of literature problematizing the universal application of participatory approaches in development (Banerjee et al., 2010; Enns et al., 2014; Mansuri and Rao, 2013; McGee and Gaventa, 2011; White et al., 2018). Against this background, we argue that community-led ecosystem management should not be understood as a means of increasing the number of people participating in governance processes, but rather as a method for increasing interactions between different social perspectives and epistemological viewpoints.

The manuscript is structured as follows. We start with a two-part literature review, first introducing the concepts of EVOs and 'citizen science' as relatively new approaches to participatory conservation. We argue that through their citizen science-based design, EVOs are meant to overturn the typical top-down flow of information from scientists to citizens, replacing it with participatory dialogue (knowledge co-creation). The following section then reviews the relevant literature on narratives and theories of change, explaining our approach to project assessment. In the empirical part of the article,

we present our case study, the M-EVO project in Huamantanga, Peru, and provide a comprehensive analysis of the narratives elicited from the stakeholders. The last section offers some conclusions, as well as recommendations for both academics and development practitioners.

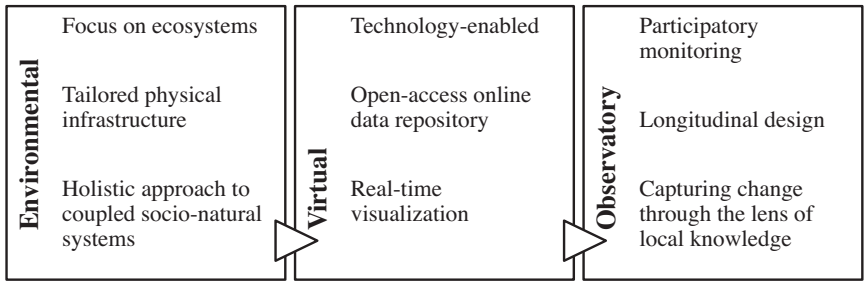
COMMUNITIES, ECOSYSTEMS AND KNOWLEDGE(S): CITIZEN SCIENCE AS A NEW APPROACH TO ENVIRONMENTAL RESEARCH

At its best, participatory research carries within its core the implicit objective of undermining the power imbalances induced by knowledge system hierarchies (Blaikie et al., 1997; Freire, 1997). Escobar's (1995) work on the 'making and unmaking of the third world' drew attention to the mechanisms through which both knowledge, and control over its use, move between the experts/scientists and the people whose lives it affects. According to Gaventa and Cornwall (2001: 70): 'Knowledge, and in particular the process of its production, contribute strongly to the mobilization of bias. Empowerment through knowledge means not only challenging expertise with expertise but expanding who participates in the production in the first place'. Since then, participatory research scholars have focused their efforts on disrupting the institutionally maintained monopolies of knowledge, revealing the deep-rooted power inequities that invalidate and de-legitimize local knowledge (Ferguson et al., 2010; Maina, 2011). They have critiqued conventional research strategies, referring to the structural relationships of power and the ways they are maintained by monopolies of knowledge (Akena, 2012; Cornwall, 2008).

In development studies, research focusing on the processes of knowledge creation and dissemination often assumes an epistemological dichotomy between scientific and local knowledge systems (Briggs, 2005; Howes and Chambers, 1980). The latter is said to be socially embedded and contextually bound while the former favours inter-contextual transferability and generalization (Agrawal, 1995, 2002; Apffel-Marglin and Marglin, 1990). In the case of ecosystem knowledge, however, the subjectively perceived lived experience is an indispensable element in a comprehensive analysis of the socio-natural environment, providing grounds for an alternative, complementarity-focused approach, embodied in the new participatory approaches to development research (Bohensky and Maru, 2011; Norris, 2014; Sillitoe and Marzano, 2009).

Fuelled by technological breakthroughs — low-cost environmental sensor networks and information and communication technologies (ICT) — participatory projects have recently expanded in both range and scope (Haklay, 2013; Norris, 2014; Shirk et al., 2012). The recent advances in monitoring and measuring technologies allow for the efficient and precise collection, analysis and sharing of data by ordinary citizens and, as such, have the

Figure 1. Environmental Virtual Observatories: Core Components Explained



Source: Authors' elaboration

potential to bring participatory research to scale. As a result, some of the most recent participatory approaches to conservation build on the notion of citizen science — the practice of community participation in the research process alongside the professional scientists (Haklay, 2013). EVOs are an example of this approach: encompassing the gathering, processing and distribution of knowledge with and by community members, EVOs embody the principle of a bottom-up practice that takes into account local priorities, practices and values (Karpouzoglou et al., 2016). This is depicted in Figure 1.

PROJECT NARRATIVES AND THEORIES OF CHANGE

While the value of participatory science as a novel data-generating approach has already come under the scrutiny of researchers (Corbett and Keller, 2005; Wiber et al., 2009), assessing stakeholders' experiences of participation has always been elusive (Mendoza and Prabhu, 2009). Aiming for 'participatory knowledge co-generation', EVO projects tend to lack tangible outcomes that could be turned into quantifiable indicators. Accordingly, the purpose of our assessment is to capture the experience itself, its potential to trigger attitudinal changes, and the prospects of these changes resulting in improved decisions about ecosystems and livelihoods. In order to capture the diversity of stakeholders' perspectives we turn to retrospective narratives: reconstructions of past events in a meaningful sequence.

In principle, project narratives examine social reality as stories of experience, or perceptions, rather than facts or events (Abell et al., 2004; Roe, 1991, 1994; Venot, 2016; Watts, 2001). With the use of narratives, development actors construct the notion of projects' purposiveness and, more often than not, success: a good story can 'sell' a project and help secure future donors (Hickel, 2016). Interestingly, project narratives are not often explicit about how practitioners 'imbue ideas and practices with positive connotations of success and how value is constructed across time and space'

(Büscher, 2014: 79). Mosse argues that narratives are the driving force behind the development industry: 'policy doesn't drive practice as much as stabilize and highlight interpretations of it' (Mosse, 2005: 103). Through narratives, development actors — donor agencies, research organizations, NGOs and the beneficiaries themselves — strive to maintain coherent representations of their actions as instances of authorized policy.

Conceptualized as such, project narratives are closely linked to 'theories of change' (James, 2011). Usually produced by project managers, theories of change (ToCs) are detailed scenarios that describe how a certain set-up of conditions leads to specific results (Mackenzie, 2005). Contrary to project narratives, which materialize both prior to, during and after the intervention, theories of change are employed at the planning stage. Aimed at promoting the desired long-term goal, theories of change illustrate how each intermediate outcome links to another in a logical flow (Brest, 2010).

Importantly, theories of change are also considered monitoring and evaluation tools. By dividing the project timeline into clear-cut intervals (situation analysis, inputs, outputs, outcomes, impacts and long-term goals) ToCs allow the practitioners to evaluate whether the intervention is progressing as planned (Connell and Kubisch, 1998). Textbook ToC guidelines explain that if inputs do not lead to outputs, we can talk about implementation failure. If outputs do not lead to outcomes and impacts, we are dealing with theory/assumptions failure. These assessments are often performed by trained project managers, with the use of predefined measurable indicators. As such, they reflect their values, beliefs and cognitive biases.

In our research, we focus on 'theories of change' generated by all the stakeholders *after* the project's closure. By asking them to generate their own storylines of the project (project narratives) we construct alternative theories of change, reflecting the unique worldviews, perceptions and value systems of the stakeholder groups. Through a narrative, they make sense of, and indirectly evaluate, the intervention in a way that is both unfettered and inclusive. A storytelling approach in participatory assessment allows us to minimize the bias present in regular interviews, as 'members of different cultures, because of the specific and unique demands of living in their societies, make sense of their experiences in different ways' (Driscoll, 2001: 236). By asking the project's stakeholders to tell us the 'story of the project' (produce a project narrative) we engage them in an exercise whereby they attribute categories, causalities and valuations to otherwise disconnected events, or 'project actions', in ways that make sense to them (Czarniawska-Jeorges, 1998: 5). 'Thus, narratives exhibit an explanation instead of demonstrating it' (Polkinghorne, 1988: 21). As a tool of assessment, storytelling represents a particularly inclusive, participatory evaluation methodology: it accommodates diverse voices and perspectives without external filtering and framing (Chouinard and Milley, 2018). Unlike a standard assessment approach that is imposed from the outside, the storytelling approach emerges organically from within the project (Costantino and Greene, 2003).

INTRODUCING THE CASE STUDY: MOUNTAIN-EVO

We chose the Mountain-EVO project as an illustrative case of the EVO, a new model in participatory environmental monitoring. To date, the majority of EVOs have been developed in the Western world (e.g. NERC EVO and E-BIRD), and applications in developing countries are still very novel (Cieslik et al., 2018; Karpouzoglou et al., 2016). The Mountain-EVO project started in 2014 in Huamantanga, Peru.[1] Funded by the UK Research Council's ESPA programme (Ecosystem Services for Poverty Alleviation), its purpose was to develop a community-led (Mountain-) Environmental Virtual Observatory as a decentralized platform for ecosystem knowledge generation and exchange. With participatory research at its core, M-EVO was to explore the linkages between mountain ecosystems and poverty alleviation in cooperation with the local stakeholders. For a period of three years, the inhabitants of the Andean community of Huamantanga participated in environmental monitoring of their mountain ecosystem, observing and tracking the rainfall and discharge of two watersheds located in the headwaters of the Chillón river, ground temperatures in the village and in the highlands, wind power and rainfall volume. Citizen science — in the form of participatory workshops, on-the-ground hydrological water experiments with community members and monitoring activities — played a key role in the design of the M-EVO, as illustrated in Figure 2.

While, in principle, the EVO model assumes continuous data collection (submitting environmental observations with the help of ICT) and real-time virtual visualization (virtual platform), these were not fully achieved in the case of M-EVO. As a prototype, proof-of-concept project M-EVO represented a blueprint in which approaches and methodologies were tested and, as such, it generated important insights for future iterations of the model.

Throughout the three-year course of the M-EVO project, an interdisciplinary team of researchers including natural scientists (hydrologists, geologists and civil engineers) and social scientists (sociologists, anthropologists and development specialists) paid regular visits to the site for stays varying between one day and two weeks. As is often the case for research projects, the composition of the team changed, ranging from two to six persons at a time, and included both postgraduates and tenured faculty. The project's primary implementing team, however, was a Peruvian branch of a South American NGO, Consorcio pare el Desarollo Sostenible de la Ecoregion Andina, or CONDESAN (Consortium for the Sustainable Development of the Andean Ecoregion). CONDESAN's mission is to support sustainable development in the Andes, with a particular focus on ecosystem

1. The Mountain-EVO project was also implemented in three other high-altitude locations: Nepal, Ethiopia and Kyrgyzstan. In this article, we focus only on the Peruvian case.

Figure 2. Overview of M-EVO Activities

M-EVO Project Activities in Huamantanga	Description
PROJECT LAUNCH: JULY 2014	
Weather monitoring	Weather stations are installed by the M-EVO/CONDESAN team, measuring temperature, precipitation and wind power on the slopes surrounding Huamantanga (July 2014).
Hydrological monitoring	M-EVO/CONDESAN team installs sensor networks measuring the flow and volume of the streams, and the water levels in the reservoirs (July 2014).
Workshops and training sessions	Participatory workshops and training sessions for the community members, explaining the ecosystem processes and the importance of water conservation as well as the purpose and benefits of all the equipment (sensors) (February 2015 to December 2016)
Participatory experiment: mamanteo exploration	M-EVO/CONDESAN team design a hydrological experiment to test the mamanteo system. The experiment is implemented together with community representatives (February 2015 to December 2016). Restoration and upkeep activities of the mamanteo network.
Participatory experiment: pasture closure	In order to estimate the effect of overgrazing on water infiltration and retention, M-EVO/CONDESAN team proposes to close part of the highland pasture. The experiment is thoroughly discussed with the community during participatory workshop sessions (March 2015).
User-driven software design	Researcher-led focus groups and individual interviews are organized in Huamantanga to elicit feedback on the (potential) design of a virtual knowledge-sharing platform.
Community exchange programme	By means of lottery, 10 project ambassadors are selected from the Huamantanga community. They visit the neighbouring community of Tupicochu to exchange knowledge generated through the M-EVO project; afterwards the representatives of Tupicochu visit Huamantanga (December 2015 to March 2016).
Demonstration field	School students and instructors construct an irrigated plot behind the school grounds, in which they plant new varieties of tubers, as well as vegetables, to assess their suitability for high altitude (November 2016).
Information visualization	In cooperation with the school authorities, M-EVO/CONDESAN team open the Huamantanga information centre at the school and install a monitoring data display board on the town square (November 2016).
PROJECT CLOSURE: DECEMBER 2016	

Source: Authors' elaboration [Color figure can be viewed at wileyonlinelibrary.com]

conservation.[2] Within the Regional Initiative for Hydrological Monitoring of the Andean Systems (Iniciativa Regional de Monitoreo Hidrológico de Ecosistemas Andinos — iMHEA), CONDESAN has played an important role in setting up low-cost hydrological sensor networks in several Andean

2. See 'Nuestra Misión y Visión' ['Our Mission and Vision'] on the CONDESAN website: https://condesan.org/nosotros/mision-vision/

states. These include the Mountain-EVO implementation site in the rural village of Huamantanga.

Research Site Description: Huamantanga and Livelihood Strategies in the Andes

Huamantanga is a district and an agricultural community in the Peruvian Andes. It is located at around 3,500 m above sea level, and 150 km from the country's capital city, Lima. Situated in the headwaters of the Chillón River, Huamantanga is important for the region: the local land use practices impact the river's discharge (flow and volume) and affect the availability of potable water for downstream populations, including that of Lima. In response to the lack of water during the annual six-month dry period, pre-Incan ancestors of the current inhabitants of Huamantanga developed a complex system of diversion canals in the highlands, referred to as *mamanteos*. Mamanteos extend the water availability period from local wells further into the dry season (Pérez et al., 2017). According to the health census of 2015, the community numbered 593 in that year (ibid.). Increasing outmigration to the capital constitutes a major challenge for the survival of the community whose livelihoods depend heavily on small-scale agriculture (Vila, 2014). A large proportion of the population raise cattle and grow crops — an increasingly risky subsistence strategy in a semi-arid and only partly irrigated terrain.

Importantly, the livelihoods of the inhabitants of Huamantanga are closely intertwined with the dynamics of the mountain ecosystem. Despite the community's dependence on livestock raising, pastures are poorly irrigated. During the dry season, with diminishing water availability, farmers bring their cattle to the collective highland pastures, which leads to overgrazing and soil and ecosystem degradation, a condition that Pérez and Hommes (n.d.) call a 'vicious circle of poverty' (see also Ochoa-Tocachi et al., 2016). The local NGO, CONDESAN, has been carrying out hydrological monitoring operations in the tropical Andes region for a number of years. However, the M-EVO project represents the first attempt to engage with the members of the local community and involve them in participatory monitoring.

Narrative Research Method: From Data Collection to Analysis

Primary Sources

Our investigation began with the reconstruction of the project's metanarrative: the theory of how M-EVO is supposed to bring about positive change. Although the project did not have an explicit theory of change document,

it did follow an organized, coherent storyline, made explicit in the funding grant document as well as on the website, both of which were developed by researchers participating in the M-EVO consortium. Accordingly, in our research, we applied the theory of change in an inverse manner: instead of deploying it as a planning tool, we used it as a post-factum structuring tool. Mapping the ToC core categories (problem setting, inputs, outputs, outcomes and long-term goals) onto the storyline presented in the documents allowed us to reconstruct the metanarrative or main storyline of the M-EVO intervention.

Field Research Design

The field research was conducted in Huamantanga and Lima between September and November 2016. Following Freeman (1984), we define stakeholders as everyone who affects or is affected by a decision or action. In our case study we identify three groups: the researchers from European universities who designed and supervised the M-EVO, the NGO that implemented all the action points on the ground (CONDESAN), and the Huamantanga community members who were either directly (participating in project's actions) or indirectly (experiencing the effects of the change induced by the project) involved in M-EVO. Some of the interviews with the researcher group were performed via Skype in the months following fieldwork. We first applied a convenience sampling design (Robinson, 2014), followed by snowball sampling (Heckathorn, 2011), and finally deliberate sampling (i.e. singling out key stakeholders). The resulting 34 interviews were complemented by participant observation materials (notes and transcripts from community assemblies) and notes from two group discussion sessions. In total, we interviewed 23 inhabitants of Huamantanga, including 16 *comuneros* (land and cattle owners), one representative of the local-level authority, three representatives of informal institutions, and four project 'ambassadors'. The majority of our informants were men (17 out of 23). We also interviewed six persons working for CONDESAN and five researchers from the M-EVO consortium.

The purpose of the interviews was to generate a narrative; this was initiated by a narrative stimulus, which usually took the following form:

- Narrative stimulus: 'Could you tell me the story of this [M-EVO/ESPA] project?'
- Elaboration: 'Please describe, in your view, how and why it [the M-EVO project] all began, what happened in those three years, and where it is supposed to lead?'.

The duration of the narratives varied between 20 and 120 minutes. Some of the informants were uncomfortable with being recorded; in such cases,

we took notes instead. All the interviews were conducted in Spanish, transcribed in Spanish, and then coded. The fragments chosen as representative quotes were then translated into English for the purpose of this manuscript.

Narrative Analysis

In social science, narratives are strictly defined structures facilitating sense making in the social world. Elliott (2005) stresses three important aspects of this definition — chronology, meaningfulness and contextuality — and argues that stories are the basic units by which causality is attributed to events and actors and communicated to the audience. Some important characteristics of narratives are referentiality (each story in some way references reality, although not in a direct way); verisimilitude (as opposed to verifiability); hermeneutic composability (dynamically negotiated context specificity); and accrual (stories accumulate, flow from older ones) (Bruner, 1991). In this respect, they are similar to theories of change, where causality (how inputs link up with outputs, outcomes and impacts) takes precedence over chronology.

We applied a two-stage analysis: thematic (content-focused, horizontal, across all the narratives within each stakeholder group) and structural (focused on referential and congruity functions) (Riessman, 2008). Within the thematic analysis, the main coding categories (primary codes) were defined a priori with reference to the relevant research areas, corresponding to the categories in a theory of change chart: situation analysis, inputs, outputs, outcomes and long-term goals. As a result, we arrived at three generalized collated scripts, one for each stakeholder group.

RESULTS: MULTIPLE PERSPECTIVES

Reconstructing the Project's Metanarrative

Table 1 illustrates the project's storyline, which we reconstructed from the project grant document and website materials and mapped onto the standard ToC logical framework chart. As the Table illustrates, the narrative forms a coherent storyline, with identified problems (acute degradation of Huamantanga's ecosystem; lack of reliable data), followed by the logically linked series of actions and effects, leading to the desired impact, or the problem's resolution (leveraging the potential of ecosystem services to address poverty-related issues in the community). The line of reasoning that the metanarrative represents is also well integrated with recent Peruvian legislation, in particular with the new environmental law on ecosystem

Table 1. The Reconstructed M-EVO Metanarrative Mapped on the Theory of Change Chart

Social/ environmental problem/reason for the project	**Logic model reconstructed from the metanarrative**				**Long-term objective**
	Input	**Output**	**Outcome**	**Impact**	
Acute degradation of the ecosystem, in particular water supply, soil fertility, and land cover Data scarcity/ data bias (remoteness, exclusion) Knowledge gap	Low-cost environmental sensors Local data processing Interactive visualizations Community outreach: consultations, training, workshops	Citizen science; participatory monitoring Capable, empowered community Rich, locally relevant data	Ecosystem knowledge co-creation Ecosystem conservation Improved natural resource governance	Breaking the vicious circle of poverty Improved livelihoods Improved resilience Adaptive governance	Toolbox/ protocols for global replication Learning

Source: Authors' fieldwork

compensation.[3] The narrative is characterized by both a targeted action orientation and an ingrained notion of positivity. The project's narrative thus presents itself as a blueprint for success, bearing in mind that: 'success is not merely a question of measures of performance; it is also about how particular interpretations are made and sustained socially' (Mosse, 2005: 158). In the next stage of the research, we proceeded to reconstruct the narratives that the project's stakeholders built up by themselves, and for themselves.

Citizen Science: The Narrative of the Researchers

The story of the project as depicted by the researchers (see Table 2) opens with a deep concern for the development challenges faced by communities in mountain regions (remoteness, exclusion) and an appreciation of recent technological advances. In the researchers' view, the availability of low-cost sensor networks and the global expansion of ICTs have created ideal conditions for harnessing the power of science to directly impact livelihoods. As one of the scientists on the project reports:

> The kind of information that could be generated [with these sensors], those kinds of insights resonated very strongly with local questions about land-use change, the interrelation between forests and deforestation and water supply for instance. So that quite quickly ended up in a very strong and successful collaboration between scientists, local civil society, NGOs, individual farmers, government, and local government entities.[4]

3. Ley N°30215 de Mecanismos de Retribuciones por Servicios Ecosistémicos of 2014.
4. Skype interview with a researcher, January 2017.

Table 2. The M-EVO Narrative as Perceived by the Researchers (Mapped on the Theory of Change Chart)

Social/ environmental problem/reason for the project	**Logic model reconstructed from the metanarrative**				**Long-term objective**
	Input	**Output**	**Outcome**	**Impact**	
Acute degradation of the ecosystem, in particular water supply, soil fertility, and land cover Data scarcity/ data bias (remoteness, exclusion) Knowledge gap Recent technological breakthroughs	Low-cost environmental sensors Local data processing Interactive visualizations Community outreach: consultations, training, workshops	Citizen science; participatory monitoring Capable, empowered community Rich, locally relevant data	Ecosystem knowledge co-creation Ecosystem conservation Improved natural resource governance	Breaking the vicious circle of poverty Improved livelihoods Improved resilience Adaptive governance	Toolbox/ protocols for global replication Learning

Source: Authors' fieldwork

From this point on, the researchers' perception closely mirrors the project's metanarrative, with particular focus on participation and citizen science (Table 2). Another researcher respondent told us: 'I found the participatory aspect of this project spoke to me at once. When they advertised for the job, they directly said along the lines of citizen science, leveraging citizen science for this, this EVO development. … And I really liked the participatory element of it, and I jumped right on-board!'.[5]

The fact that the *participatory monitoring* was mostly performed by CONDESAN's employees does not seem to have dispelled the notion among the reseachers that the project was an example of citizen science. Another researcher recounts:

> A group of us went up the mountain, I went up just with X and Y [CONDESAN employees]. So I was with them that first time and they collected the data …. And we went for one night, went up the mountain, did a little hike around all the monitoring sites and came back, and drove back [to Lima] in the morning.[6]

The researchers hope that the output of these data collection activities — rich and robust datasets of river flow and precipitation — are being 'processed and used' locally. The desired outcome of co-created ecosystem knowledge that leads to improved livelihoods is still expected. While the researchers express a genuine concern for the community's well-being they are also conscious of the wider value of the EVO as a pilot research study:

5. Skype interview with a researcher, March 2017.
6. Skype interview with a researcher, May 2017.

Table 3. The M-EVO Narrative as Perceived by the Community Members (Mapped on the Theory of Change Chart)

Social/ environmental situation/ problem	**Logic model as perceived by the community members**				**Long-term objective**
	Input	**Output**	**Outcome**	**Impact**	
Unique mountain ecosystem, worthy of scientific interest The 'mamanteos' Water shortage Lima's water need Young people leaving Huamantanga	Low-cost environmental sensors Talks/ presentations	Low-cost environmental sensors; project's infrastructure Increased awareness Validation of local knowledge and practices Inspiring the youngsters	International interest in Huamantanga Keeping the youth in Huamantanga	Ecosystem conservation Local pride	Learning 'Technification' of Huamantanga

Source: Authors' fieldwork

they describe the 'invaluable lessons' that can be drawn for future replications of the EVO idea in similar settings. Indeed, M-EVO has been hugely impactful from the research perspective; it has been credited with a number of invaluable interdisciplinary insights and a number of papers (see, e.g., Bastiaensen et al., 2017; Manz et al., 2017).

Send Us Agronomists: The Narrative of the Community

Not recognizing their landscapes as degraded, soils as eroded or pastures as desertified, our respondents in the community group believe the reason for external interest in the area lies in its mountain environment or, alternatively, the presence of the unique irrigation system, the mamanteos (see Table 3).

> You mean, why they came here? Oh, it is the mountains! They all want to learn about our mountains!
>
> They [the scientists] will understand better the Inca practices, and how the wind, and rivers, and land all interact. This is how science works, how science is made. … Now [the] Huamantanga case will give them even more insights on all this, this irrigation technology.[7]

While fully aware of, and concerned about, the diminishing rainfall, the inhabitants of Huamantanga do not seem to see how the M-EVO project can help improve the situation. When pressed about the purpose of the monitoring stations, one of the respondents reports:

7. Interview with a member of the community, Huamantanga, September–November 2016.

> It is to capture the times when it rains, and these areas must be conserved, the areas where these instruments are installed, and they … hmm … I think they are connected, they can measure, where the zones are where there is going to be more rain, maybe?
>
> (Are you aware that the machines don't predict weather?) Yes, yes. But they, maybe, they can maybe give you a hint? Like, what the weather is now. And how it is going to change. No? I really don't know, you must know more about this.[8]

Another respondent reflects: 'so we thought, we hoped that the project will bring us more water, but no, it is only to help keep water in, inside the mountain'.[9]

Aware of the eagerness of both the researchers and CONDESAN to provide 'actionable knowledge' to them, the inhabitants of Huamantanga made a conscious effort to apply what they learned from the project's numerous meetings. Although the end of the project was already in sight, a number of our informants asked when the 'engineers and agronomists' are going to visit them to help them apply the 'knowledge' generated by the monitoring stations — which was not, in fact, a component of the project.

This 'knowledge lock-in' might be partly explained by the fact that, mainly due to lack of internet availability, the monitoring data were not circulated in the community until the very last weeks of the project, when the CONDESAN field staff came up with the idea of a paper-based information booklet (the bulletin). In addition, in the days immediately prior to the closure of the project, a LED screen was installed in the main square of Huamantanga, displaying real-time temperature and some of the hydrological monitoring data. Before that happened, however, the utility of monitoring was perceived as low. As one community member expressed at the community assembly:

> First, to this day, people here are wondering, no? All the time we talk about this and that, but we do not have any quality of results, we do not know what are these temperatures that are being recorded. That is, we sort of know, we understand, but records, documents are not there, we really have no understanding what, during those three years, what was this all about. Why not put it down for us, it would be so much easier, I mean, with all this machinery, you would think, the community should be informed a little more, no?[10]

Two respondents reported that, in the second year of the project's implementation, some of the comuneros decided to give up project activities, a loss of faith in the project that was further deepened by the upcoming 'field experiment' — closing one part of the highland pasture. Intended as a participatory experiment, the purpose of freeing a section of the highlands from grazing animals was to demonstrate whether restoring the vegetation would help water conservation efforts. The scientific principles of the investigation were not, however, easily communicated. One or the respondents recalls:

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8. Interview with a member of the community, Huamantanga, September–November 2016.
9. Interview with a member of the community, Huamantanga, September–November 2016.
10. Interview with a member of the community, Huamantanga, September–November 2016.

'[the pasture closure experiment] oh, yes, it started badly. It should have been explained, explained to everyone, not only to some of the comuneros. The highland pasture belongs to the community, you see'.[11] Although the setback was eventually corrected by effective action by the CONDESAN field staff, it is striking that the researchers' group made no mention of it in interviews. In fact, there seems to be relatively little overlap between the perceptions of the M-EVO project as narrated by these two groups.

Despite such frictions, the vast majority of our community respondents report a very positive experience of the project. However, their perception does not match the metanarrative. For example, the monitoring stations are highly appreciated in themselves, regardless of the lack of weather-predicting function (actual utility). Interestingly, the respondents see the sensors as both an input and an output of the project — a clear material gain for the community. Another difference concerns the perceived nature of the project's activities: what the researchers describe as participatory training and workshops, the emblems of participatory science, the community members refer to as 'talks and presentations', aimed at teaching them about the principles and necessity of conservation.

Last but not least, the community members' narratives reveal a plethora of unintended effects that triggered positive change in the village: international interest in Huamantanga, a boost to local pride and confidence, increased environmental awareness and new interest in the region's potential as a tourist destination. The M-EVO project thus managed — albeit unintentionally — to successfully address a problem that, in the community members' perception, constituted a real and pressing threat: the ever-increasing outmigration of young people to Lima (more on this below).

Livelihoods are the Link: The Narrative of the NGO

Respondents from CONDESAN, a conservation-oriented NGO, recognize the problems fleshed out by the M-EVO metanarrative, and they mention ecosystem degradation as the main driving factor for the intervention. In contrast to the researcher group, however, they also acknowledge the role of what they refer to as 'unsustainable' and 'irresponsible' agricultural practices of the community members.

> So it is, all this, it makes a circle, that is, a vicious circle, where people are driven by the need for more water and start to bring their cattle to the highlands; and so overgrazing begins …. And then, of course, it results in less water (infiltrating down inside the mountain). But if you give them more options in the lower pastures maybe they would keep their animals there instead, and water would be stored in the highlands. And then we would have more conservation and the vicious circle would become a virtuous circle.[12]

11. Interview with a member of the community, Huamantanga, September–November 2016.
12. Interview with CONDESAN employee, Huamantanga, September–November 2016.

Table 4. The M-EVO Narrative as Perceived by the NGO Staff (Mapped on the Theory of Change Chart)

Social/ environmental situation/ problem	Logic model				Long-term objective
	Input	Output	Outcome	Impact	
Irresponsible agricultural practices (overgrazing) Acute degradation of the ecosystem Unique mountain ecosystem The 'mamanteos' Lima's water need Data scarcity/ bias	Low-cost environmental sensors Grassroots work (electing committees, assigning project ambassadors) Talks/ presentations Field experiments	Low-cost environmental sensors; project's infrastructure Community learning: demonstration field, information centre, information screen Baseline for future projects/ funding Locally relevant rich data	International interest in Huamantanga Integrated perspective linking conservation with livelihoods Strengthened relationship with the community	Ecosystem conservation Agreed collaboration with private sector to continue the project (SEDAPAL)	Learning Conservation

Source: Authors' fieldwork

Providing the community with better livelihood opportunities is seen as key to achieving conservation goals in the highlands (see Table 4): 'But it was more like that: let us see, let us investigate, this unique case of comprehensive hydrological monitoring. Let us see what and how it affects, does it help us conserve the pastures? How much water would it give us?'.[13]

Since the CONDESAN project team consisted mainly of engineers specializing in hydrological monitoring, learning how to engage with the people on the ground was a challenging process. As one of the informants revealed: 'for me the hardest thing [in the M-EVO project] was working with the community itself'. And while commenting on the participatory science aspect of the project, another respondent explains: 'no, it wasn't workshops. For us, what we have done, it is not so much training, but rather presentations, like, talks, at the community assemblies, you see, to try to make everything clear for them'.[14] In the NGO's view, sensitizing, explaining and instructing through presentations and talks were the main means to bring about the project's objectives.

> But now the process has been improving, each time they [the community members] understand it [the M-EVO project] a bit better, they think they are getting involved, they are

13. Interview with CONDESAN researcher, Huamantanga, September–November 2016.
14. Interview with CONDESAN researcher, Lima, September–November 2016.

> becoming more aware that the idea is not for us to take advantage of them but rather to always look for balance. For ways to make it productive for both: for them and for conservation as well.[15]

During the implementation phase, CONDESAN respondents report going to great lengths to adapt to the community's preferences and to make the project respond to their actual needs. A good example of this is the special attention paid to freezing temperatures, which the Huamantangan farmers declared to be of particular importance for their potato crops. One of our respondents describes this moment as a breakthrough: 'I remember I told X that we have to make the community benefit somehow and he was like: "we can't do that, the project, it's not for that" …. Wrong! Livelihoods is the connection!'.[16] In the words of another respondent:

> You see, after a while the community begins to feel that need to start getting something. They say: well, back then you said that we are going to be gaining some things with this project that we agreed to have here, but we saw no proper benefit until now …. And that's how we came up with the new project, the Sedapal one. This one is focused more on sustainable livelihoods.[17]

It is important to note that improving livelihoods was, in fact, a direct objective of the M-EVO metanarrative, stemming from its ESPA founding grant — Ecosystem Services *for Poverty Alleviation*. In the perception of CONDESAN, however, M-EVO appears to have been seen as a data-driven project that required a follow-up intervention — in partnership with the water supply company Sedapal — to actually deliver on its promises of helping poor households.

Exploring the Narrative Misalignment

Apart from the discrepancies between the three 'theories of change', our research revealed a different distribution of tensions in the three storylines. A standard narrative plot begins with a set-up, followed by rising action leading to a climax and finally falling action and resolution. What we observe in our data is that different stakeholders see the 'peak point' of the project as embodied in different events: we diagnose this as narrative misalignment.

The researchers' storyline is the closest to the standard plot, with action build-up through the subsequent 'citizen science' activities and diminishing attention in the months leading to the closure of the project. The storyline of the community members, however, has a much slower ascent, suffers a brief plunge with the controversial pasture-closing experiment, and then gradually rises as CONDESAN's staff begin to introduce complementary livelihood-oriented activities: a farmer-to-farmer exchange with the

15. Interview with CONDESAN employee, Lima, September–November 2016.
16. Interview with CONDESAN researcher, Huamantanga, September–November 2016.
17. Interview with CONDESAN researcher, Huamantanga, September–November 2016.

neighbouring village of Tupicocha, a demonstration plot meant to introduce new potato species, and the bulletin to showcase data from the monitoring stations. In other words, we can see a build-up to a different action climax.

The misalignment reveals that, in terms of long-term goals, the community members have high hopes for what the project is yet to bring. As one of the informants told us:

> CONDESAN came to install pluviometers in the highlands. With a group they came, first came X, and then the rest.
>
> (Why did they come? What for?) Well, they came to study the water, and rain, when it will rain, how much it will rain, and of course, how much water that rain will create on the ground.
>
> (What is the purpose of this knowledge?) Of course, the learning, it is coming soon now.[18]

Along with learning, the often mentioned 'technification' of Huamantanga is highly desired and still expected to come in due time. Despite the obvious wrap-up of the project's activities, more benefits are anticipated:

> It would be great to bring more specialized people, you know, per domain. Someone who could explain better in what way we can act, to better ourselves, no? In what way can the project be carried [forward]? … If someone from agriculture could come, and from livestock science, for our improvement …. That would be a suggestion for things to go better.[19]

DISCUSSION

Our investigation thus reveals that the stakeholder groups have rather different visions of what has actually happened in the village of Huamantanga. Despite M-EVO's participatory credentials and hierarchical organizational structure, each of these groups seems to maintain its own interpretation of the project's *raison d'être*, with few crossovers during the course of three years of collaborative work. For the community members, the main problem reported was the water shortage and the resulting depopulation of their village. For the representatives of CONDESAN, the primary issue was halting the unsustainable agricultural practice of overgrazing in the highlands. The researchers, for their part, saw the main problem as the lack of sufficient information about the workings of the mountain ecosystems.

The attempted integration of different knowledge systems was hindered not only by their apparent incompatibility but also by different valuations, and the way that these affected the stakeholders' involvement in, and perception of, the project. While the researchers stressed the collective, two-directional nature of the M-EVO learning process, both the community members and the NGO perceived the researchers as the knowledge providers whose expertise is to be bestowed upon Huamantanga, to 'technify' it. The

18. Interview with community member, Huamantanga, September–November 2016.
19. Interview with community member, Huamantanga, September–November 2016.

fact that such a transfer never took place was, at times, a cause of discord. At the same time, local knowledge was found to be held in high esteem by the community members, who often referred to the scientific data as validating what they had already known.

> All those theories [indigenous ecosystem knowledge], you see, they now look at us for explanation. We know that they are true, and now science can tell us why. Like, on the night of a full moon, do not pick up the eggs, because they will all break. Do not hurt yourself then either, or you will end up with an infection. … And since we have 100 such cause–effect observations, we have to look for a scientific explanation for them, to finally understand what our grandparents taught us, with more measurement instruments, and more technology, so that it does not stay just a myth.[20]

While proud of the rich repertoire of the traditional ways of knowing (e.g. using moon phases to guide the crop calendar), the community still looked up to the scientific process as a legitimizing factor. This, again, points to the perception of the knowledge systems as unequal in status. What the researcher and NGO groups perceive as knowledge co-creation, most of the informants thought to be just another form of interviewing.

Knowledge, like any other resource, determines what is conceived as important, for whom and by whom (Howes and Chambers, 1980). Empowerment through knowledge means not only challenging expertise with expertise but expanding who participates in the production of knowledge in the first place (Agrawal, 1995, 2002; Apffel-Marglin and Marglin, 1990). By design, EVOs offer the possibility to turn the typical top-down flow of information from scientists to citizens into a more interactive actor dialogue (knowledge co-creation). At the same time, they bring to the surface new modalities of power and contestation between different visions and expectations held by stakeholders about the purpose/design/use of EVOs. Professional scientific communities that have a central role in the design of EVOs bring their own disciplinary methods and expectations about outcomes, as do funders, international development agencies and NGOs. Different actors can therefore exercise significant power over the design of EVOs and spark new forms of inequality. As our M-EVO case study illustrates, agreeing on the management of the EVO can be a difficult point of negotiation between stakeholders.

Perhaps the most striking observation concerning knowledge processes is the converse attribution of information utility. While all three stakeholder groups hold ‘science’ and ‘knowledge production’ in very high regard and identify it as a long-term objective of the M-EVO project, they never acknowledge that they themselves will benefit from it. As recounted by an NGO employee: ‘so we [M- EVO team] say [to the community members]: okay we want to provide you with information about your ecosystems through monitoring. And then, we give you this information so that you

20. Interview with community member, Huamantanga, September–November 2016.

could use it and you find it interesting, and then take better decisions'.[21] In contrast, a community member asserted: 'Why, [this project] is about the mountains! … It is for the sake of science, and knowing, and understanding the processes, [we are doing it] for the scientists!'.[22] Although, by design, EVOs represent fuzzy structures that flexibly adapt to users, it is rather disconcerting that most of our informants attribute its benefits to one another and not to themselves.

A Note on Assessment

Our study represents an attempt at participatory assessment; however, our results are more relevant for the EVO model in general than for this particular application (M-EVO). This is because we refrain from comparing the stakeholders' scripts with an 'objective' representation of what 'actually happened' in Huamantanga. In narrative research, verisimilitude takes precedence over verifiability, and stories are always judged only against their own coherence. For this reason, although our results reveal a number of implementation hurdles specific to the site (e.g. connectivity issues, staff shortage), our discussion focuses more on the broader issues related to knowledge co-production.

While our results prove that all the stakeholder groups have a positive experience of the project overall, we also find that particular perceptions vary across and within stakeholder groups. The guarded reaction of the Huamantanga cattle owners to the attempted closure of the highland pasture can serve as a good example here: though conserving water would potentially benefit them as much as the rest of the community, it also presented a real threat to their immediate interests. Accordingly, our results dispel the illusion of the project as a site of shared and targeted action driven by uniform policy models and managed by homogeneous stakeholders (Mosse, 2005). As shown in the previous section, these differences seem to be driven either by conflicting interests of stakeholders, or by the conflicting assumptions (externally designed but locally relevant) of the M-EVO project.

In this light, our findings have important consequences for theorists and practitioners of monitoring and assessment. While, in the past, development evaluation concentrated on input–output relationships in projects, the more recent trend is to cover the entire ToC results chain of inputs, outputs, outcomes and impacts (van Es and Guijt, 2015). Measurable by tangible actions and products, inputs and outputs can be quantified and represented with relative ease. Outcomes and impacts, as well as long-term goals, refer to the abstract dimensions of social change. 'Empowerment' and 'improved livelihoods' can be interpreted differently by different stakeholders. The way that

21. Interview with CONDESAN employee, Lima, September–November 2016.
22. Interview with community member, Huamantanga, September–November 2016.

these concepts are operationalized and measured depends heavily on one's perceptions and values. This is also supported by the secondary findings of our research: our narrative investigation revealed a number of side-effects (externalities) that made the M-EVO an overall positive and worthwhile experience. We now analyse these events, proposing an alternative theory of change for the project.

Beyond Success and Failure Scenarios: Integrating Positive Externalities

Communities living in remote mountain areas operate with a much higher level of complexity than is possible to include in a theory. Practitioners are often confronted with a reality in which neat project logic simply does not work. While it might be feasible to 'plan out' change that entails simple provision of tangible products or services, inducing and subsequently capturing social change is a very complicated matter.

In the fragment quoted below, one of the community members describes a transformative learning moment that he encountered during an exchange with a neighbouring community where the participants had investigated alternatives to technical irrigation. Though seen by the researchers as only a complementary activity, this farmer-to-farmer knowledge transfer seems more valuable to his day-to-day decision making than the meticulously collected monitoring data.

> This señor (whom we met at Tupicocha), it has been his great need to irrigate his crops. But he had nothing. What he did was to water first with an empty milk can …. That little can, he filled it with water and made a hole in the bottom, but in there he also put, like, a wick, made of sheep wool, so he could regulate the water that was dripping from the can onto the plant. That is what that señor had. And now he endowed that knowledge onto us! To us, all of a sudden, he could bring this great experience …. He started like this, then grew, and now he has his water reservoir. And so now on his plot he has all varieties of produce, he has carrot, lettuce, beans, alfalfa, varieties of products! This señor does not depend, like we do, on the city, we here only bring such things from Lima. No, this señor has everything, everything is there at his disposal. And that very production is made at a height of 3,800 meters.[23]

An example of what econometrics calls a 'positive neglected externality', this quote aptly illustrates the importance and value of unpredicted impacts. In the course of our evaluation, we encountered a number of similar instances: social phenomena that, though not necessarily anticipated or assumed by the M-EVO, directly or indirectly lead to achieving 'positive change'. Another example of a 'neglected externality' concerns the declining demographic of Huamantanga — an issue that many informants found to be a serious problem.

> You see, there are also many children of the comuneros who have left the community; many are professionals, different branches, engineers, doctors, no? But the problem is, as I tell

23. Interview with community member, Huamantanga, September–November 2016.

> them, to those people, that we have abandoned our community. They each went to, for work, you see, to Lima, here in Peru, but also to America, to Europe … but they forgot their obligation to come back here, and to work for the community.[24]

This community member sees the M-EVO project as an opportunity to reverse the outward migration trend. He explains: 'Then in that case the knowledge that was taken there [during the exchange with Tupicocha] motivated these youngsters a lot. And then it is them who talk to their parents, friends, families, and they also get motivated to change their ways'.[25] The intergenerational knowledge transfer (youngsters and school children sharing their learnings with their parents and extended families) was particularly visible during the project activities conducted at the school: knowledge generated through the demonstration field and the weather station reached the farmers through informal chats at home.

The importance of 'keeping the Huamantanga people in' is also expressed by a comunero when he explains his vision of the long-term goals for the M-EVO project:

> My vision is that everything would be green, so green then, and there is enough water everywhere, because ecologically, that is good for everyone, for the whole population directly. And we all will get to work here, here on our home land, because in the long term this would be the profitable way to go. And nobody would have to travel to Lima, to work, they would stay here to do the work for this land and to benefit from its products.[26]

Another minor, but interesting example of a neglected externality came from a CONDESAN employee who, when recounting the story of their latest visit to Huamantanga, noted that the community members have adopted a number of professional hydrological terms (like 'precipitation', 'rain gauge', 'catchment area') in their ordinary conversations. Renewed interest in the local ecosystem, including both transitional ways of knowing and the new technical jargon propagated by the projects, triggered what we call an 'ecological knowledge revival'.

These neglected externalities also have implications for monitoring and assessment. Koch and Schulpen (2017) argue that a better understanding of positive unintended consequences of development allows us to capitalize on the multiplier effects, while deeper insights on negative externalities can lead to a better anticipation and timely development of mitigating measures. Looking at our results, we hypothesize that, for some projects, positive externalities might actually outweigh the planned impacts in terms of relevance to the beneficiaries. With the help of the narrative assessment method, we have been able to capture and explore these effects (see Table 5). In so doing, we challenge the binary logic of project

24. Interview with community member, Huamantanga, September–November 2016.
25. Interview with community member, Huamantanga, September–November 2016.
26. Interview with community member, Huamantanga, September–November 2016.

Table 5. Neglected Positive Externalities

Neglected positive externalities	Description
Community-to-community knowledge transfer	According to the M-EVO project assumptions, the community members of Huamantanga were to disseminate the co-produced knowledge to the neighbouring communities (e.g. the village of Tupicocha). Our informants made us aware that a reverse trend took place: the people of Tupicocha shared important hands-on solutions to the problem of water scarcity with the people of Huamantanga, in the spirit of 'communities of practice'.
Inter-generational knowledge sharing	Although working with school children was not assumed by the M-EVO project, the staff and pupils proved an invaluable resource to the project. The school children and their instructors became actively involved in the M-EVO implementation. The school developed and managed a 'demonstration field' in which new crops were to be tested and maintained, and the weather station was installed within its premises. As a result, a number of parents recounted learning about water and ecosystems from their children.
Ecosystem knowledge revival	The M-EVO project was technology-heavy, and included temperature, precipitation and wind monitoring stations. These technical instruments proved attractive for the youth who expressed renewed interest in learning about their local ecosystem and making the most of the natural resources.

Source: Authors' fieldwork

assessment that frames a project's success exclusively in terms of pre-defined outcomes and impacts.

Participation Debate Revisited: EVOs as Knowledge Spaces

While community-based conservation has at times failed to deal with the complexity of multi-stakeholder projects, the benefits of shifting from expert-driven to participatory approaches are increasingly acknowledged (Beirele and Cayford, 2002; Berkes, 2007; Pouw et al., 2017). At the same time, placing community involvement at the centre of conservation is both contested and very difficult to implement (Bhatt and Tandon, 2001; Brosius et al., 1998; Enns et al., 2014).

In certain ways, our results are consistent with previous research indicating that the presence of specific stakeholders might not significantly increase the quality of ecosystem governance (Beatley et al., 1994). As Brody (2003: 413–14 writes: 'Competing views on the planning process burdened by multiple groups wanting to voice their opinions may hinder the quality of the outcome. … Broad and diverse stakeholder participation can thus lead to a "lowest common denominator" when it comes to plan quality because there are fewer opportunities for agreement'.

Our study builds on the existing body of literature examining the complex modalities of participation, from the seminal work of Freire (1970) to more recent critiques by Cooke and Kothari (2001) and Mansuri and Rao (2013).

We believe that, despite their participatory aspirations, EVOs as spaces for representation in governance are not neutral. They are shaped by the existing power relations that surround and permeate them, which are far stronger than the participatory discourse of the project. For effective participatory governance of an environmental project, stakeholders need to not only have the right to participate within the given space but also the power to define and shape that space. Like many development interventions, the M-EVO project might not have delivered sufficiently in this respect.

CONCLUSION: NARRATING PERCEPTIONS, CREATING REALITY

In this research, we explored the new model of participatory environmental monitoring, the Environmental Virtual Observatory (Cieslik et al., 2018). Our analysis exposed important differences between the stakeholder groups' perceptions and assessments regarding the three-year, stakeholder-driven project. As a researcher-driven project, M-EVO represents an attempt to make research relevant for society in order to have wider societal impact and to engage with societal stakeholders. While engagement has occurred, to varying degrees, across the timeframe of the project, the different stakeholders expressed very different perspectives on 'outputs', 'outcomes' and 'impacts' of the intervention they were all part of. Our results show how assumptions and expectations about participatory projects are entrenched in project narratives. These often refer to 'project success', despite there being little or no agreement among the stakeholders about what would constitute success (Glover, 2010; Mosse, 2005; Roe, 1994). Our analysis reveals at least three distinct positive externalities that, though not assumed by the project, are of considerable significance to local stakeholders. These include community-to-community knowledge transfer, inter-generational knowledge sharing and ecosystem knowledge revival.

The observed discrepancies in the perception and valuation of shared events — the vastly different versions of, principally, the same social reality — have been described in development anthropology literature:

> [T]o understand the practices (of development) we need to understand that development is a form of production and has one primary output, or product: which is the project. … But the pursuit of the good project develops a logic of its own that shapes the allocation of resources and the kind of activities we see independently of external interests but also relatively independently of beneficiaries' needs and preferences. (Krause, 2014: 4)

Acknowledging that narratives do not reflect but in fact construct social reality, we believe that a 'community-driven knowledge co-creation' paradigm will continue to shape future research designs in the ecosystem conservation domain (Paschen and Ison, 2014).

In his analysis of the 'social production of development success', Mosse argues that successful projects are those that manage to maintain coherent

policy representations (2005: 157). A large part of development practice involves the social (re)construction of policy models that are not so much implemented as superimposed onto incongruous reality (Phillips and Edwards, 2000). Our research confirms that, as a tool of assessment, storytelling represents a particularly inclusive, participatory evaluation methodology: it accommodates diverse voices and perspectives without external filtering and framing. Unlike a standard assessment approach that is imposed from the outside, the storytelling approach emerges organically from within the project (Costantino and Greene, 2003). In the words of Mosse (2005: 157): 'A development intervention cannot, in fact, proclaim its own reality, as it is always contingent on outside judgements: it's the interpretative work of experts to discern meaning from events by connecting them to policy ideas as texts — logframes, documents'. For this reason, the assessment of a development intervention depends less on the project activities that did or did not occur, and more on the ability of stakeholders to link their experience with the overarching policy theory, as expressed in ToCs — in this case, participatory knowledge co-creation. The pressure to be 'policy relevant' and to incorporate the 'buzzwords and fuzz words' of the day plays a decisive role in narrating development (Cornwall and Eade, 2010).

Nearly 30 years after Long and Long's famous (1992) metaphor of development as a 'battlefield of knowledge', we still struggle to reconcile participation and patronage, policy and practice, a project's reality and its representation. Although directly targeting knowledge ranks and power imbalances, Environmental Virtual Observatories might not yet offer the long-awaited breakthrough. They do, however, open up the discussion of alternative approaches, trigger critical reflection and cultivate self-awareness among development practitioners and researchers alike. Improved understanding of the stakeholders' experiences of EVO participation can guide future interventions, fine-tuning the model for increased efficacy.

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