PARTICIPATORY ASSESSMENT OF SUSTAINABILITY IN SMALLHOLDING AGRICULTURE: THE AGROECOLOGICAL CASE IN CENTRAL AMERICA

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Sommario

Nell'ambito del progetto Uni.Coo, è stato realizzato un progetto di ricerca in partenariato tra l'Università di Torino e l'Ong Re.Te. Con il fine di valutare la sostenibilità dei sistemi agroecologici di piccola scala in America centrale è stato promosso un processo partecipativo coinvolgendo tutti gli stakeholder più rilevanti. Il processo partecipativo mirava innanzitutto a sviluppare una definizione condivisa di sostenibilità, e in secondo luogo a definire uno strumento per la valutazione della sostenibilità dei sistemi agroecologici basato su indicatori e facilmente fruibile. Questo articolo descrive ed analizza le diverse fasi del processo partecipativo fornendo suggerimenti per ulteriori attività di ricerca nell'ambito degli strumenti di valutazione partecipata della sostenibilità per l'agricoltura su piccola scala.

Abstract

Within the Uni.Coo project, a partnership research project between the Turin University and the Italian Ngo Re.Te has been developed. A participatory process has been carried out to assess the sustainability of agroecological small-scale agricultural systems in Central America considering all relevant stakeholders. A participatory process was initialized firstly to develop a shared definition of sustainability and secondly to design a user-friendly and indicators-based framework for the assessment of the sustainability of agroecological farming systems. This paper aims to describe and analyze the steps of the participatory process giving insights for further research in the field of sustainability participatory assessment tools for small-scale farming.

Keywords

Uni.Coo, sustainability, agroecology, small-scale farming, Hesofi

Introduction

The Uni.Coo project (UniTo for International Cooperation) is a university student mobility programme on international and development cooperation with African, Latin American and Asian countries, which aims to promote scientific and academic cooperation in developing countries. Within the Uni.Coo framework in 2015 a partnership research project between the Turin University and the Italian Ngo Re.Te has been initialized. Hence, a participatory process has been carried out to assess the sustainability of the agroecological small-scale agricultural systems in Central America. The aim of this research project was to merge scientific and empirical perspectives on agroecology into a tool, which would empower agroecological movements of Nicaragua, Honduras and El Salvador in their influence on political institutions and policy-makers by producing scientific data based on farmer's sustainability self-assessment. During six months of field research three scholars of Turin University, the Ngo Re.Te, academics, members of farmers' movements and local farmers worked together in order to develop a practical tool for the multidimensional assessment of sustainability in smallholding agriculture. This instrument has been characterized by a participative approach and validated by several scientific institutions. Indeed, Universities of Italy, Nicaragua, Honduras and El Salvador jointly sustained the research process collaborating with several stakeholders linked to small farming and agroecology in Central America. This process led to both empirical and theoretical results. The Uni.Coo project's experience in Central America was an interesting example of multi-stakeholder process, which could be used as basis to further develop similar research experiences in the field of smallholding agriculture and sustainability.

The objective of this paper is to show the development of the participatory process, highlighting the steps that allowed a significant participation and the production of a scientific sustainability assessment tool. Several stakeholders have been directly involved in Nicaragua, Honduras and El Salvador, such as Universities, Ngo, Institutions, National farmer organizations and farmers. The experience gained through this process comes from already existing networks and experiences, that arose thirty years ago in the Mesoamerican region, and this paper wants to continue to trace the same path in order to stimulate similar activities in the future. This paper thus first briefly analyzes the situation of small farming and agroecology in Latin America, then it describes the local farming context and finally the principal steps and results of the participatory process are showed. The authors wish that this experience would support research in this field in order to improve small farming conditions and boost the scaling up of sustainable practices in agriculture through agroecology.

1. SMALLHOLDING AGRICULTURE AND AGROECOLOGY IN NICARAGUA, HONDURAS AND EL SALVADOR

Since the Earth Summit held in Rio de Janeiro 1992 small scale agriculture has been recognized to be a key factor for food production and environment management, considering the farmer based approach crucial in international agendas in order to gain sustainability in world food production (Rio Declaration, 1992). Small farmers represent the majority of the agricultural productive units in the world, but the vast majority of them cope with low resources availability and rural poverty (Fao, 2015a, Altieri, 2009).

There is still not a universally accepted meaning of small farming, so for the aim of this paper we need to refer at smallholding agriculture considering it in the Central American context, naming a small farm an agricultural unit which is managed by family members who represent most of the farm workforce, with small productive areas and characterized by low income, few means of production and limited financial access.

The definition of agroecology was born in the ‘30s of the twentieth century principally linked to agronomic studies, its meaning evolved during time as the scientific community accepted it as a bulk of multidisciplinary knowledge and practices to get sustainability in agriculture, not just in a productive and agronomic point of view, but also considering its social, economic and environmental dimension, finally defining it as a Science, a practice and a movement (Wezel et al., 2009). Agroecology can be interpreted as the application of ecological principles to the study, design and management of sustainable agroecosystems with the aim of stabilize them, increasing their resilience and resistance, reducing needs of external inputs through the creation of benefic biological synergies in the farm system (Gliessman, 1990). Agroecological practices are peculiar to each local ecosystem and adapted to environmental and socio-economic local conditions, all of them share the aim of increasing soil regeneration, biodiversity, optimization of the use of local natural resources and diversification through low capital intensive instruments based on local traditional and scientific knowledge (Altieri and Nicholls, 2005).

In Latin America agroecology has consistently widespread over the last 30 years with important positive results obtained by means of a wide participation of various and different actors such as farmers movements, grass roots movements, Ngo and Universities. Farmers had an active and important role in the extension of agroecology in Latin America through the peasant process of technological and technical innovation “Campesino a Campesino” (CAC), farmer to farmer in English, which had taken place for the first time in Mesoamerica more than 30 years ago (Altieri e Toledo, 2011). CAC is a bottom-up process of generating capabilities based on a horizontal

transmission of knowledge through farmer to farmer knowledge sharing method of information diffusion starting from community to national scale level (Rosset et al., 2011). Various Latin American countries have experienced positive scaling up of agroecological practices use at national level through this participative and multi stakeholder approach (Holt-Gimènez, 2008).

The new scenarios of participatory approaches in rural development and agricultural research emphasize the comparative advantages of farmers and scientists in generating knowledge and propose innovative ways to combine local and global science (Neef A., Neubert D., 2011). Within the approaches that combine various forms of stakeholder participation with scientific research, our contribution aims to bring some innovation in the creation of self-assessment tools that could impact on policy-making.

Nicaragua, Honduras and El Salvador are characterized by the lowest human development indices in Latin America, large segments of the population are suffering of chronic malnutrition and high poverty rates, especially in rural areas (Fao, 2015b). Since the sixties the policies adopted for the development of the agricultural sector have been based on Green Revolution's precepts encouraging monoculture plantations of commodities for exporting markets with the use of high impact practices of input-intensive agriculture, characterized by exploitation of resources, unsuitable land use, deforestation, erosion, low returns for hectares and economic dependence. In poor rural areas, the producers operate with simplified production systems that do not allow an improvement in living conditions, with little diversification of production which sometimes do not guarantee neither the basic food needs of the family. Hence, on one side there is industrialized agriculture, which is characterized by a large use of external inputs and high outputs mainly destined for export. On the other side, there is a weak, economically and technologically, agricultural network: smallholding agriculture. Despite its weaknesses, smallholding agriculture in Central America brings together the largest number of agricultural production units compared to industrialized agriculture (Rodríguez et al., 2013).

From an historical point of view, both Nicaragua and El Salvador in the '80s experienced socio-political changes, namely the Nicaraguan and Salvadoran Civil War, which consisted in violent conflicts between the military-led governments and left-wing guerrilla groups. Especially in El Salvador indigenous minorities in rural areas were persecuted, and in both countries the armed conflict led to the creation of strong networks between peasants, which permitted to maintain ancestral traditions and cultural identity. These rural networks, developed during the civil war, last still today in form of widespread cooperativism. The solidarity of producers within associations and cooperatives today is also a form of defense to face the difficulties that have arisen since the development of the phenomena of the *Maras*, criminal gangs of youngsters which has led to a

decrement of security and an increase in violence and criminalization of the society, especially in El Salvador and Honduras. Finally, these networks of farmers and cooperatives that originated within this strong associative system can also reduce the vulnerability of rural areas, support families and smallholding farms to face climate change and preserve the ecosystem (Agrawal, 2010).

The research was inserted in a wide multi-country international cooperation project that started in 2012 and was called "*Strengthening the advocacy capabilities in public policies on Food and Nutrition Security of three organizations of small producers that promote agroecological and organic production*"[I]. The project is managed in partnership between the Italian Ngo Re.Te. and the Nicaraguan Unión Nacional de Agricultores y Ganaderos (Unag) and it has been financially sustained by the International and Cooperation program of the European Commission.

The aims of the project focus on the promotion of the participation of small agroecological producers of Nicaragua, Honduras and El Salvador in the institutional spaces in which are defined and applied policies for food security. Actions have been realized in order to strengthen the competences of peasant grassroots organizations in developing and implementing food policies based on organic agriculture and agroecology at national levels. Various peasants' movements have been boosting ecological practices at local levels in the three countries for more than twenty years, but with scarce results in terms of scaling up at institutional confrontation for policy suggestions.

The project's activities included dissemination and scientific validation of the agroecological models, which will allow producer organizations to defend their rights and to participate in the political debate on agriculture policies at national level, as well as improvement of the strategic coordination. The project promoted social network creation among national and international stakeholders such as Universities, grassroots associations, consumers, Ngo and farmers' movements for their advocacy in the process of consultation, drafting of laws, policies and setting of programs focusing on environmental sustainability, product diversification and fair trade. Main beneficiaries of the project were different farmers' organizations, bringing together 19,700 agroecological and organic producers, involving university in the three Central American countries and in Italy. Within this context, a multidisciplinary team of young researchers supported a participatory process for the creation of a tool for self-assessment of sustainability for Central American agroecological smallholding farming.

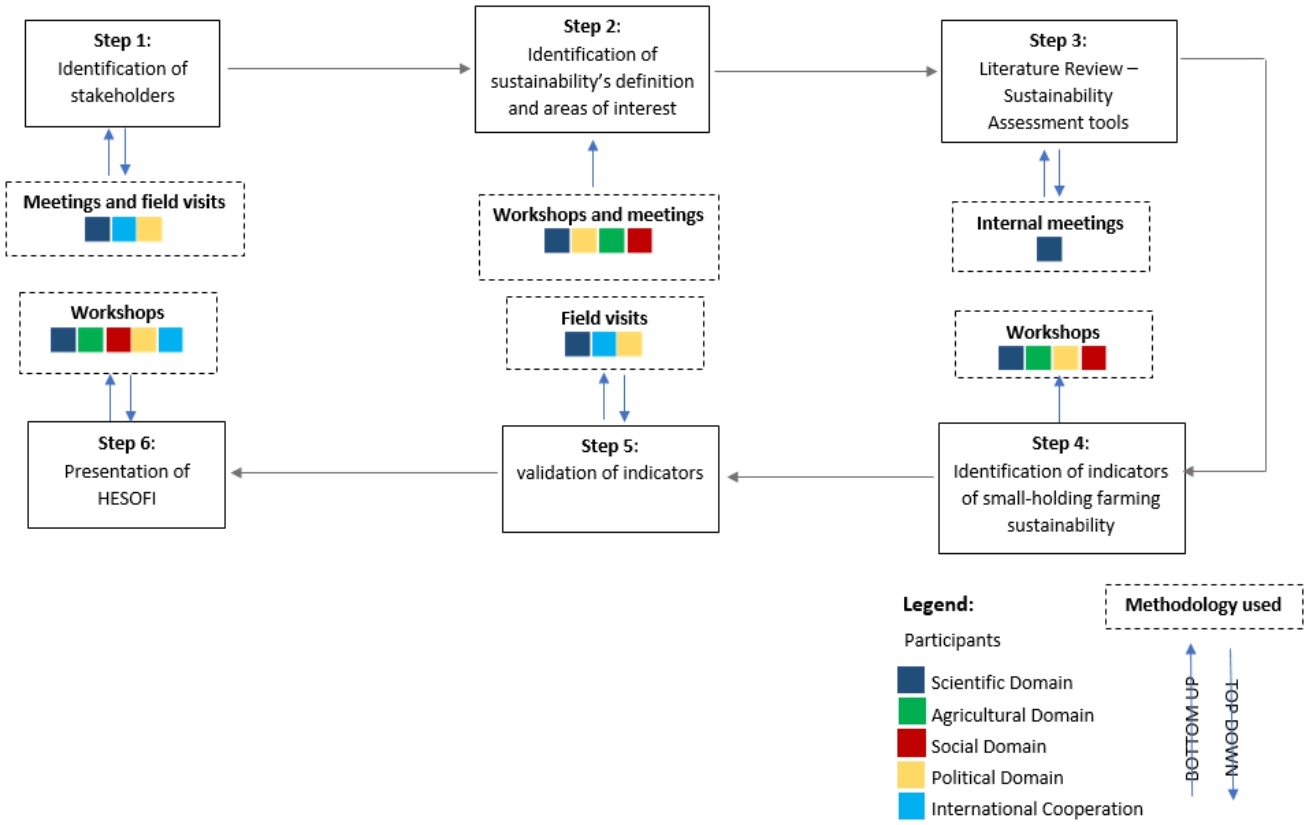
[I] The original name in spanish is: "*Fortalecimiento de las capacidades de incidencia en políticas públicas en SAN de tres organizaciones de pequeños productores que promueven la producción agroecológica y orgánica*".

2. THE PARTICIPATORY PROCESS

Agricultural sustainability can be interpreted within a multidimensional approach considering all the factors that agriculture influences such as the social, economic and environmental dimension. Therefore, during the research project a participatory process was initialized aiming to develop firstly a participatory definition of sustainability and secondly a user-friendly and indicators-based framework for the assessment of the sustainability of agroecological farming systems. Once the main areas of small-scale holding in Central America had been identified, for the purpose of conducting a participatory process to create a sustainability self-assessment methodology different types of stakeholders representing the world of research, small-scale agriculture and rural communities, and organizations of rural development on a territorial and regional scale have been involved (Wezel et al., 2009). Incorporating in the process of decision-making the multiplicity of stakeholders it is possible to create a tool that considers the various needs and can represent them jointly. During the process several stakeholders were gathered together in Nicaragua, Honduras and El Salvador. Similarly, both bottom-up and top-down approaches were combined in the different stages of this participatory process. As recent literature points out (Chamaret et al., 2007, O'Ryan et al. 2015), these approaches are combined to answer many of the needs for information and management tools of stakeholders (bottom-up) and also to enhance the legitimacy of such tools (top-down).

Figure 1 shows the steps of the participatory process that led to the development of a shared methodology to assess sustainability of small-holding farms in Central America. The diagram shows the activities of each step, highlighting the participants who have been involved, the approaches and methodologies that have been used. Each step is discussed in the following chapters presenting the main issues and methodological concerns required to obtain a sustainability self-assessment tool.

Figure 1. Steps of the participatory process. *Source*: the authors



3.1 Identification of stakeholders

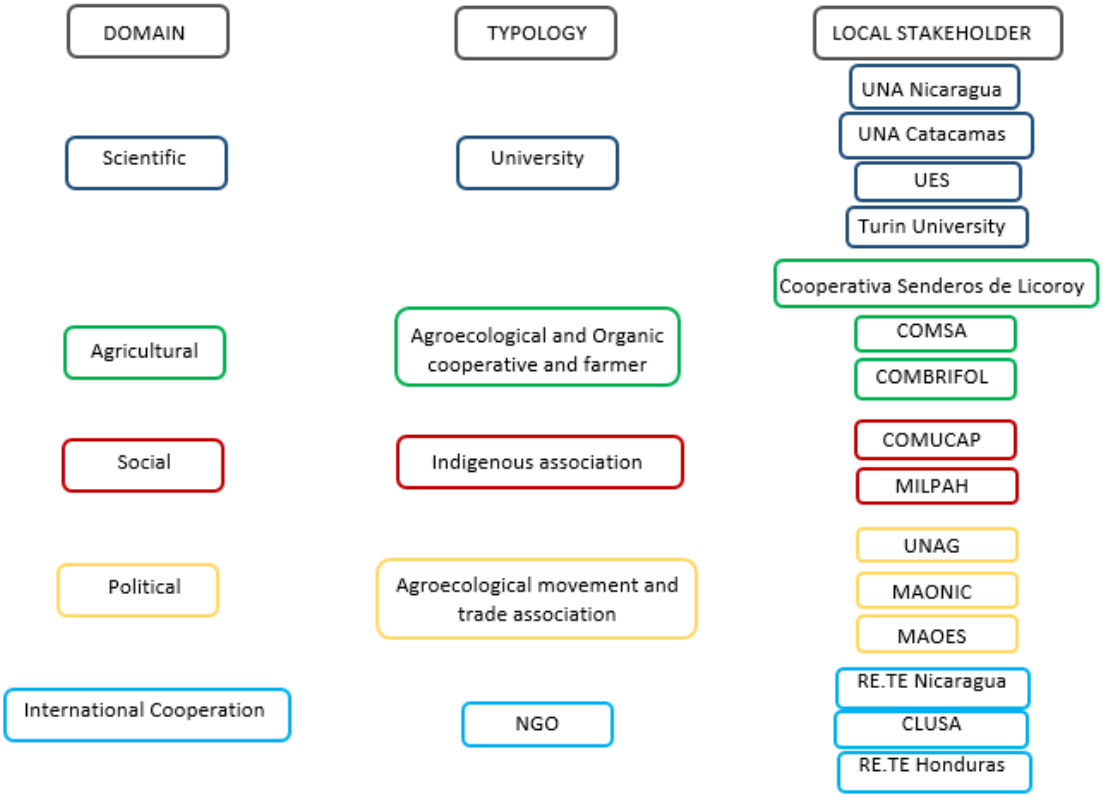
The first step was identifying all the stakeholders who would represent the complex agricultural, socio-cultural and political context. For each of the three countries, approximately a participant for each domain was selected. Priority was given to those who had already participated in past activities of evaluation of agricultural systems or in research about agroecology, who had agricultural and agroecological expertise, who had experience in dialogue with public and private institutions in policy making and in managing of rural development projects on a territorial scale, and finally who represented rural communities. Local key stakeholders have been involved through meetings and field visits to identify decision-makers' expectations (Carof et al., 2013) and needs: university professors representing the regional academic landscape; agroecological and biological farmers representing small-scale agriculture; cultural associations representing indigenous minorities and knowledge; agroecological movements and cooperatives representing the governance of territorial processes.

In their definition of agroecology, Wezel et al. (2009) highlight these domains: scientific, agricultural, social and political. As shown in Figure 2 each domain was represented by different stakeholders from Nicaragua, El Salvador and Honduras. Firstly, the scientific domain was

embodied by several universities. Secondly, the agricultural domain was represented by agricultural and organic cooperatives, which gather together agroecological and organic farmers. Thirdly, indigenous associations stand for the social domain. Moreover, the political domain was embodied by agroecological movements and trade associations.

The participatory process involved a final additional domain, not included in Wezel et al. (2009)'s definition: international cooperation, represented by local Ngo.

Figure 2. Stakeholders involved into the participatory process. *Source*: the authors



3.2 Identification of a definition of sustainability and areas of interest

After finding out the stakeholders, their main needs were collected in a participatory process through a series of workshops and meetings. The approach used in this phase was bottom-up, which permitted to capture stakeholder's concerns about sustainability. These would then be covered by the strategic areas of the new sustainability self-assessment tool.

Through this approach during the first meetings a shared vision of sustainability was identified by clustering the critical issues of farm sustainability highlighted by stakeholders in three sustainable dimensions (Figure 3). Moreover, the workshops and meetings allowed to gather their expectations about a participative tool for sustainability assessment associating these expectations with different

areas of interest (Figure 4).

Figure 3. Vision of small-scale farming sustainability. *Source*: the authors

Issues of Sustainable Farm		
Socio-political dimension	***Economic dimension***	***Environmental dimension***
· Life quality	· Business Planning	· Seeds
· Healthy nutrition	· Self-sufficiency	· Water Basin
· Education	· Product Diversification	· Soil
· Gender Equity		· Water
· Relationship with Public Institutions		· Ecosystem Protection
· Farmer and Family Awareness		

Figure 4. Areas of interest for local stakeholders. *Source*: the authors

Six different Strategic Areas emerged:	
1.	To represent cultural identity
2.	To allow comparison with other types of agricultural management
3.	To facilitate dialogue with institutions and universities
4.	To facilitate understanding by farmers
5.	To represent the production unit
6.	To analyze critically the agricultural system

3.3 Literature Review

The suggestions arisen and collected during the workshops were later complemented with information from a literature review, which was carried out mainly during internal meetings. The literature review included scientific articles about assessment methods of agricultural systems sustainability, specifically *Saemeth*[II] by Peano et al. (2015), a scientific tool of 52 indicators with the aim to assess the sustainability of a small-scale agri-food system; *Cmb*[III] by Vázquez Moreno (2013), that allows to define the level of complexity of the production system; *Mesmis*[IV] by Astier et al. (2011), an important and widespread study that uses a participatory methodology for assessing sustainability. Moreover, technical documents were analyzed, such as the *Manual Tecnico Agroecologico* (Mta) provided by Maonic (2014), a methodological framework created by farmers with the aim of gathering the information needed to plan a development program to improve the management of the agroecosystem. Finally the main legislation of agricultural practices of the region was considered, such as the *Norma Tecnica Obligatoria Nicaraguense* (Nton, 2012), that lays down the guidelines and procedures for characterizing, verifying, regulating and certifying the agro-ecological system; the *Reglamento Técnico Centroamericano* (Rtc, 2015), a binding supranational law document of 123 articles that proposes to regulate organic production and certification throughout Central America, through the alignment of the laws already existing in individual states.

3.4 Identification of indicators of smallholding farming sustainability

The following step of the participatory process consisted in planning and boosting several workshops in each country which allowed stakeholders to identify both a shared concept of sustainability and environmental, social and economic indicators to measure it. As a result, a long list of indicators came out and each one was allocated to the dimensions previously identified, namely the social, economic and environmental dimension. All stakeholders contributed in this phase identifying the indicators to be included within the tool. At the same time, researchers along with the academic sector were able to attribute various scores and ranks corresponding to each indicator. Finally, in order to allow stakeholders to get familiar with the tool and to test it, the analysis of an experimental group of farms owned by some of the participants of this part of the process has been carried out.

[II] *Sustainable Agri-Food Evaluation Methodology*.
[III] *Coeficiente de Manejo de la Biodiversidad*.
[IV] *Marco para la Evaluación de Sistemas de Manejo de Recursos Naturales Incorporando Indicadores de Sustentabilidad*.

3.5 Validation of indicators

Such indicators were later tested and validated on field visits by researchers and technical staff of agroecological movements involved in the process. A face to face interview methodology was designed based on a semi-structured questionnaire. A total of twenty field visits to agroecological small farms that produce coffee, cereals and livestock and twenty interviews to the respective holder have been realized in this phase in order to obtain farmers' perceptions on the tool and to assess its functionality.

3.6 Presentation of a new Sustainability Self-Assessment Tool: Hesofi

Finally, a workshop with stakeholders of the three countries was held to show the systematized results of the interviews and to present the new sustainability self-assessment tool. As result of the process, all stakeholders gathered together presented Hesofi[V], *Farm Sustainability Assessment Tool* its English name, the final assessment tool structured in 3 levels of analysis: dimensions, then components and finally indicators. Hesofi consists of 71 qualitative and quantitative indicators, distributed into 12 components, each gathered together in the 3 dimensions of sustainability (agro-environmental, socio-political-cultural and economic).

Hesofi aims to transpose the holistic view of sustainability into practice through stakeholder participation. This tool suggests a scientific complete insight of complex agricultural systems, considering also social issues, too often left apart in other methodologies for assessing agricultural sustainability.

Hesofi refers specifically to small-scale agriculture in Central America and therefore also to agroecological farms. It is a suitable tool for comparative analysis of sustainability of different farms at the same time, but also useful for comparison of the same farm sustainability at different times. This second feature of Hesofi permits to evaluate which sustainable practices need to be improved and whether sustainability has enhanced over time. These two connotations make this assessment tool useful for both farmers and agroecological movements. Hesofi is a tool, which rural populations can identify as their own. The acceptance of innovation by the local community is crucial, especially to ensure the use of the instrument not only for research but also for empirical small-scale systems management. This appropriation of the tool by stakeholders has been possible by its shaping through a successful participatory process.

[V] *Herramienta de Evaluación de la Sostenibilidad de Finca.*

4. DISCUSSION

The participatory process described in this paper showed some key success features. First, in order to achieve Hesofi, it was crucial to support a decision-making process that could take in consideration different points of view. During the participatory process the bottom-up approach was integrated with the top-down one to enhance a better appropriation of a scientific tool. The first approach captured the specific needs related to small-scale holding agriculture and allowed a better receptivity from the stakeholders of the indicators and the tool in its entirety. On the other hand, due to the employment of different methodologies, the top-down approach gave scientific validity to Hesofi allowing for a high value of international comparability.

Second, the process was much participated. In particular, the representatives of agricultural communities and agroecological movements showed since the very beginning of the whole process a deep interest to the research project, which led to an active participation into every step of the activities. Academic stakeholders were also very involved throughout the whole process. Moreover, it should be pointed out that the role of the field technicians was fundamental in order to succeed in the research and participation process. These persons are the engine of dissemination of local know-how through the Cac method. Without them, it would not have been possible to co-opt much of the stakeholders, who were finally involved. Whereas researchers promoted interaction within the agricultural science community and academics to combine and take into account the complexity of the participatory agroecological context and the diversity of all stakeholders.

Another successful element, that should be mentioned, was the presence of a consolidated multi-stakeholder network active on the field, namely agroecological movements and cooperatives, which permitted an advanced co-operation among the actors involved and therefore contributed strongly in spreading the process.

Finally, a key result of the participatory process is the common vision of what constitutes a sustainable farm according to all the stakeholders involved. This vision is multiform. Each indicator is created to measure the evolution of this vision over time, even if there were some indicators that could not be constructed due to lack of information. The tool contributes to the diffusion of sustainability self-assessment at a micro level, the farmers level, and at a macro one, the institutional level spreading a shared concept of sustainability.

On the other hand, the research project also showed some limits. Firstly, there were some marked context differences among the three Central American countries, which represented one of the main difficulties in conducting the participatory process. In those local realities where agricultural and

agroecological communities and organizations had strong roots showing high levels of activism, participation of the stakeholders to the process was intense. Otherwise, where the existing relational nets were not equally strong, participation levels were quite lower. Nevertheless, it should be mentioned, that the role of researchers helped to create a basis for a supranational networks and to foster dialogue and stakeholder participation among the different domains.

Secondly, it should be said that the validation phase started only in Nicaragua, while in the other countries the validation took place later without the presence of the researchers. Therefore local stakeholders directly led the final steps of the process. Hence, even if the research process finished, the participatory process is still ongoing and the dissemination is spreading. This shows that Hesofi accomplished to be a tool used and usable by the farmers' movements themselves.

Thirdly, a large limit that fostered the disparity among the contexts were logistical restraints to participation, e.g. the possibility to take part physically to the activities for those stakeholders who lived in remote rural areas. Distances and lack of resources contributed to this.

Finally, it should be stressed that the selection of stakeholders, on the one hand, was supported by the presence of an already existing network, but on the other it was flawed by it.

In conclusion, some topics remain open: firstly, concerns about the sustainability of the process itself are still open. Such a tool, useful and cost-free, is definitely a benefit for all the stakeholders involved. However, the participative process should continue to be managed in an enlarged and transparent manner.

Secondly, the scientific validation of the process and its positive results lay the foundation for the replication of this experience in other contexts. Although the methodology was focused mainly on agroecological farming, authors wish that this experience would be taken as reference for future initiatives that aim to develop participatory processes for measuring sustainability of agriculture and natural resources management.

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NOMENCLATURE

Cac	Campesino a Campesino
Clusa	Asociación para el Desarrollo (El Salvador)
Combrifol	Cooperativa Mixta Brisas de la Frontera (Honduras)
Comsa	Café Orgánico Márcala S.A. (Honduras)
Comucap	Asociación Coordinadora de Mujeres Campesinas de la Paz (Honduras)
Hesofi	Herramienta de Evaluación de la Sostenibilidad de Finca
Maonic	Movimiento de Productores/as Agroecológicos y Orgánicos de Nicaragua
Maoes	Movimiento de Agricultura Orgánica de El Salvador
Mesmis	Marco para la Evaluación de Sistemas de Manejo de Recursos Naturales incorporando Indicadores de Sustentabilidad
Milpah	Movimiento Indígena Lenca de La Paz, Honduras (Honduras)
Ngos	Non Governmental Organizations
Re.Te	Associazione Tecnici Solidarietà Cooperazione Internazionale
Saemeth	Sustainable Agri-Food Evaluation Methodology
San	Seguridad Alimentaria y Nutricional
Ues	Facultad de Ciencias Agronómicas de la Universidad de El Salvador
Unag	Nicaraguan Unión Nacional de Agricultores y Ganaderos (Nicaragua)
Una	Universidad Nacional Agraria (Nicaragua)
Una Catacamas	Universidad Nacional de Agricultura de Catacamas (Honduras)
Uni.Coo	Project University of Turin for International Cooperation