Establishing transdisciplinary research and learning environments for rural development – a network and process model

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Abstract: The Latin-American – European project SERIDAR aims at increasing relevance of university research and education through transdisciplinary networks for rural development in selected Latin American regions. A joint Competence Centre is being created as an international network of universities and other research institutions, grounded in local stakeholder networks where a variety of non-academic and academic actors collaborate. One of the desired outcomes is an institutionalised participatory process of generating and implementing research and education activities together with local stakeholders in rural development related subjects in the partner countries. The organisational development process so far has included the identification of local stakeholder networks in which the universities have integrated themselves with specialised facilitators and researchers, the participatory elaboration and priorisation of locally relevant development goals within the networks, the identification of knowledge needs and possible topics for research and capacity-building activities. Research topics are being taken up within a joint doctoral programme as well as students' individual and team research projects, many with a transdisciplinary approach. Some stakeholder needs are addressed with specific capacity-building or mentoring activities. Furthermore, partners have started to prepare joint research proposals on internationally relevant aspects of these topics. This paper presents and analyses the underlying inter- and transdisciplinary model of collaboration within the SERIDAR network.

Keywords: Agricultural Knowledge Systems, stakeholder participation, change processes, university – practitioner networks

Introduction

Academic and non-academic knowledge systems often lead a parallel existence even in such application-oriented research fields as agriculture, natural resource management and rural development. Nevertheless, both are needed to effectively support innovation and change processes which aim at creating more sustainable and resilient livelihoods in rural areas. It is often assumed that bridging these two worlds is the task of extension and vocational training programmes. However in many Latin-American countries, these are only insufficiently developed or non-existent, even more so because of dramatic reductions in public investments in agricultural knowledge, science and technology (AKST) (Armbrecht et al., 2008; IAASTD, 2008). Universities thus have an important role to fulfil when they aim to conduct research and education activities that are implementation-oriented and relevant to local development needs.

In Latin America, scientists are involved with different types of knowledge-related interventions to solve problems in rural areas including extension programmes, research, teaching and informing the development of policies. As the creation and strengthening of Agrarian Science Faculties throughout the region coincided with the emergence and dissemination of the Green Revolution, the education of agrarian professionals emphasised an approach centred on the technological development of agriculture. A consequence of this has been the side-lining of practitioners' knowledge – of the knowledge developed by generations of farmers – which served to support the needs of the population over centuries.

Extension work, in this context consisted of disseminate technological packages of the Green Revolution is linked to particular forms of "modernity" which promote intensification of agriculture. This type of technological extension is also associated with what has been described as a cultural invasion because of educational approaches that Paulo Freire (1998) denounces as enslaving and dominating, which deny dialogue and thereby withhold the subject – in this case farmers – from a role as actors in history. The developmental and socio-environmental policies that promote particular technologies and socio- environmental innovations associated with "modernity" often contradict each other, for example in the same area environmental conservation and agro-industrial development might both be promoted (Garcia-Barrios et al, 2011). Research centres, faculty and graduate students have made efforts to linking research and teaching on rural problems with outreach activities in the rural communities (Campos and Körner, 2006). These forms of intervention have "worked" relatively well in specific areas. However, the overarching political, social and environmental problems in rural areas have worsened over the past three decades (Hirsch Hadorn et al., 2008).

There is an urgent need for multidisciplinary theories to guide rural development practices (Van der Ploeg and Renting, 2000). It is not possible to understand the complex nature of current problems with the conventional approaches of a single discipline (Steiner and Posch, 2006). It means that research laboratories and specialized scientific circles need to come closer to farmers and their realities; enabling the inclusion of multiple views and knowledge types. Experiences of transdisciplinary research show that such processes focus on joint learning of all actors – scientific and non-scientific- , thereby often merging research with educational activities and objectives (e.g. Steiner and Posch, 2006). The focus on implementing results implies that actors in the research region need to be involved in all phases of the research - not only as a source of data and information.

How can university research and education facilitate joint learning among academic and non-academic actors? Which structures and processes are needed to support these activities? How can diverse expectations be bridged when researchers need scientific publications, students need timely graduation, and practitioners need applicable new knowledge? In this article, we describe the approach and methodologies used within the SERIDAR project which ground research and education activities in local stakeholder needs and interests and to ensure the relevance of results

to these practitioners. Our responses to these questions have emerged through reflection of our experiences in dialogue with literature focusing on academic – non-academic network facilitation and transdisciplinarity.

Introduction to the transdisciplinary SERIDAR network

Seven universities in Latin America and Europe have partnered in the EuropeAid funded project, "Rural Society, Economy and Natural Resources – Integrating Competences in Rural Development" (SERIDAR), running from January 2011 to June 2014. It aims at increasing local relevance of university research and education through transdisciplinary networks in selected Latin American regions. Partner universities include the Universidad Autónoma Chapingo (Mexico), Universidad Nacional Autónoma de Nicaragua-Managua, FLACSO Costa Rica, FLACSO Ecuador, Universidad Nacional de Colombia, Universidad de Córdoba (Spain) and Humboldt-Universität zu Berlin (Germany).

In this project, a joint research, education and training platform for rural development and related fields is being established in the form of a Competence Centre (Figure 1) which is integrated internationally (EU-LA), regionally (Andean region and Mesoamerica) and locally (in each of the Latin American partner countries). The network involves researchers and lecturers of thematically related departments in the partner universities as well as from associated organisations like RIMISP-Chile. Local actors such as farmers' organisations, rural women's groups, and water management committees are addressed as well as students in study programmes related to rural development. A joint doctoral programme has been created which specifically aims to serve junior lecturers and graduates who aspire to complete further qualification and training. Knowledge is jointly created between these diverse actors, research and education methodologies are debated across the network, e.g. in joint workshops and research activities. Hereby the international research and education networks in Latin America and Europe are brought closer together. The activities also aim at integrating academic and local knowledge systems in the complex fields of rural development, management of natural resources and agricultural value chains.

In order to bridge the gap between academic and non-academic knowledge systems, university staff have integrated themselves in local stakeholder networks involving various types of actors like farmers' groups, rural organisations and institutions of rural development. Participatory development of research programmes is central to the thematic and methodological orientation of the Competence Centre (CC). This is in accordance with IAASTD (2008) for Latin America: In order to enhance participation and democratization in defining and implementing the AKST research agenda and integrate sectors that had been excluded, providing institutional forums for discussion and decision-making was a desirable option. They also suggest developing an intercultural participatory agenda that preserves and enhances the value of local knowledge, among others. Therefore, further sections of this article are dedicated to analysing the local stakeholder networks of the consortium as strategic bases for ensuing academic activities.

Figure 1: Target groups and activities of the SERIDAR International Competence Centre for Rural Development
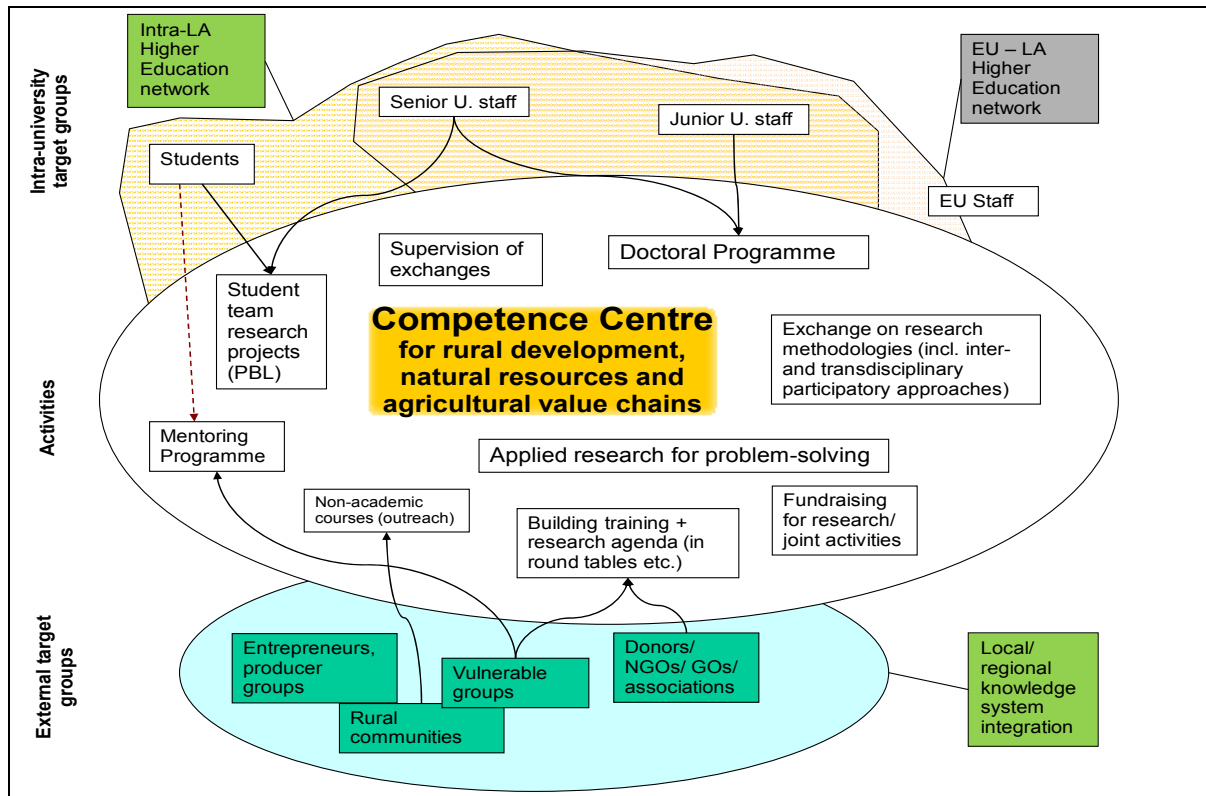
Local stakeholder networks as a basis for transdisciplinary research and education in the International Competence Centre for Rural Development

Within the SERIDAR project, a specific activity has been dedicated to the development and strengthening of collaboration between university members and rural communities, associations, non-governmental organisations (NGOs), governmental organisations (GOs), entrepreneurs and other actors in rural areas of the Latin American partner countries. Its objective is a participatory mechanism for elaborating and prioritising research and education with high relevance to local stakeholder needs. The concept of transdisciplinarity which forms the basis for the Competence Centre follows some of the principles described by Elzinga (2008), specifically transdisciplinarity as a response to ill-defined problems in reality, and a constructivist view which emphasises joint learning processes of diverse academic and non-academic actors as well as their participation in problem identification, structuring and analysis.

In correspondence with the overall objectives of SERIDAR, the working group of this activity has articulated the following results to be reached in each Latin American partner institution:

i. Establishment of formalised long-term links between researchers and networks of local actors; giving presence to universities in rural areas

ii. Initiation of continuous processes of transdisciplinary research

iii. Trust-based relationships with the networks, which make the linkages long-lasting

iv. Round tables and exchange platforms allowing analysis, discussion and decision-making about jointly defined topics, including the identification of research topics for thesis work of students and PhD candidates

v. Capacity-building, mentoring and exchange of experience in specific issues identified with the local actors

This working group has decided to work with an actor-centred methodological focus for the SERIDAR project and the Competence Centre, to move away from a utilitarian perspective on the local networks to an action-oriented one that involves the co-responsible participation of the different actors: producers, youth, women, government, NGOs and academia, among others.

Together, the group has constructed the concepts of working with the Network and the Actor: Transdisciplinary network research is a social construction that responds in a conscious manner to the mutual and concrete interests of a group of actors, many times connected to their territory, though not always. Functioning networks are based in reciprocity and the gradual increase of social capital between the participants. It aspires to put the collective interests above that of each individual. The university integrates itself as an actor focused on accompaniment and the construction, distribution, redistribution, and overall systematisation of knowledge that arises from the interaction of different sources of expertise and knowledge possessed by distinct actors. In this network vision, the actors are collective bodies and/or individuals with knowledge, learning capacity, the ability to act and interact, and associational goals according to common interests.

Installation of liaison offices and thematic working groups

In order to support the starting phase, each Latin-American partner university has a go-between ("persona de enlace") – a person specifically dedicated to coordinating new and existing relationships with non-university actors and networks in rural development, natural resource management or agriculture-related fields. They are members of the joint international working group of this project activity. Tasks of the liaisons are: to promote joint activities and set-up of participatory working groups on specific topics, to organise joint events and round tables, to coordinate mentoring and capacity-building activities, to maintain databases of the network participants and activities, to support transdisciplinary research in the Competence Centre and related study programmes.

In preparation, the liaisons for each partner university came together for a conceptual workshop, in which the objectives, strategies and methodologies for the networking activities were elaborated and the international working group was established with common vocabulary and collaboration processes. The starting point was an analysis of existing networks that each participating department had maintained. Considering the short time available of the project, it was considered easier and more efficient to strengthen existing networks rather than create new ones. The discussion in this workshop formed the basis for elaborating a conceptual paper about the nature of networks and the role universities would play in their dynamics. There was a general understanding that the university would enter as one actor among others, thereby not imposing topics on the other members. However in some cases a facilitation role was accepted.

Each of the partner universities and departments defined the criteria (and their relative importance) for selection of their networks for the purpose of articulation within SERIDAR, taking into account aspects like a) availability of academic staff who have previous relationships with the respective territory or actors, b) distance to the territory, c) political accessibility, d) possibility to establish long-lasting relationships, among others. Some universities, like the Universidad Autónoma Chapingo in Mexico or FLACSO Costa Rica linked the project to networks in territories where they already had scientists working in a certain research line, but the project allowed for a stronger transdisciplinary approach and strengthened some of the activities that were already under way. For example in Chiapas, Mexico, SERIDAR formed the pretext for reactivating the work of the Network for the Development and Conservation en the Sierra de Villaflores - *Red para el Desarrollo y la Conservación en la Sierra de Villaflores* (REDESIVI), where new plans for relevant joint work and investigation could be created. On the other hand, in the Universidad Nacional Autónoma de Nicaragua in Managua and Matagalpa, the FLACSO Ecuador and the Universidad Nacional de Colombia (Bogotá) (UNAL-Bogotá), SERIDAR created a possibility to

start work in new regions, where the liaisons facilitated the process of network formation and provided an instrument for establishing new research lines which respond to the needs of the multi-actor networks. The liaison who facilitates the formation of knowledge management networks has a fundamental role in the interpretation of local actors' needs and relating these to the capacities and interests in the universities to generate adequate alternatives.

It had been envisaged that after an initial exploratory phase, specific thematic working groups could be established in which university professors and a variety of non-university actors could come together during regularly scheduled events to discuss joint research strategies on specific challenges, as well as related capacity-building and mentoring activities. These thematic working groups should unite actors with a common interest in a certain topic. The participation of researchers in the networks has been active from the beginning of the SERIDAR project in Mexico, Nicaragua and Costa Rica. In Colombia and Ecuador, researchers integrated themselves in the second project year through intensive work of the liaisons who established the networks and identified the needs for research and capacity-building.

It was obvious that creating win-win situations would be necessary to ensure sustainability of the collaboration beyond the availability of the liaisons. For example, such win-win situations took the form of joint planning and implementation of student research projects, whereby the research outputs contribute to solving a certain problem for participating farmers or rural communities. Meanwhile, the students could practice applied and problem-based research approaches, deepen their knowledge and strengthen personal skills. The connections and experiences may even increase their chances for finding a suitable job after their graduation. The universities have also gained a positive reputation in the region because of their service-oriented engagement with civil society. However, for the researchers themselves the gains are not always so clear given the extra work load experienced.

Elaborating and prioritising joint activities
Round tables or workshops, each with a prevalent topic and professional facilitation, were organised to kick-start communication within the local network in each partner country. These and other network events served as a platform for exchange on pressing problems like climate change adaptation, rural-urban migration, food security, income generation, conflicts over natural resources, environmental degradation, lack of rural services, etc. They ultimately served to elaborate research needs (subsequent topics for CC research) and, to explore how academic staff may support local innovation processes and institution building at the village or enterprise level. Each university established – within time frames determined by the territories and networks of interest - a work plan in which the themes for work in the round tables were defined. The needs for investigation and capacity-building – i.e. knowledge gaps came up during and following the various discussions in the round tables.

For example in the case of Nicaragua, two networks have been established. It has been a main experience to define territorial platforms for collective actions. This interaction facilitates learning and innovation to create organisational competencies like the emergence of a collaboration agreement signed with the purpose to enable academic activities with a research dimension. This paves the way for the practice of university extension. Nevertheless, this is only a first step in the improvement of the interfaces with rural stakeholders, and further action is needed.

In the network RED-GESCON (*Red de Gestión del Conocimiento para el Desarrollo Rural Matagalpa y Jinotega*) a rural innovation agenda has been formulated with various actors including local government. Three contributing factors of this synergistic action can be mentioned. First, it is the result of motivation for collective action, partly generated from the "vacuum" created by the international cooperation agencies that had left the country. Therefore, Nicaragua has

reduced access to sources of financing for development. Secondly, cooperation agencies are changing the financing for development; the trend is towards building networks for development. Third, the central government of Nicaragua has launched a national project for human development and requires the plan to be implemented locally. In this sense, the SERIDAR project came at the right time. Moreover, government agencies (local governments) are seeking interactions with academia to meet the national plan for human development. These three factors have contributed to the visibility of the network and its relationship with other external actors, among which are the Inter-American Institute for Cooperation on Agriculture (IICA), the Tropical Agricultural Research and Higher Education Center (CATIE), and other agencies.

We found that written agreements on joint activities have been necessary for building trust among participants. Many rural communities have had mixed experiences with projects where they felt that knowledge was extracted from them by researchers who promoted their academic career, while the communities did not receive much in return for their time and efforts. In the agreements, the participating actors in the network agreed on objectives, scope, expected outputs and activities of the collaboration, and sometimes the distribution of responsibilities, especially between the university and local actors in the networks. Whereas in this context the main motivation is to ensure that research results and knowledge produced are discussed with the main participating stakeholders and a follow-up on stated commitments is possible. Such agreements are common in the context of university-industry collaborations which focus on regulating access to information related to innovations (Larsson et al., 2009).

Now at a later stage, research progress and results are also discussed in these platforms. In this way, knowledge bases of academic and non-academic stakeholders are merged and further developed jointly. Another benefit of these collaborations is increased relevance of teaching by participating professors, because they can more effectively relate to tangible examples and experiences in their local region.

Outcomes of the local networking activities
Partners within the SERIDAR project have succeeded to build networks for knowledge creation based on joint research agendas of local actors and academics, that recognise the real problems of the regions as well as capacities and interests of the research teams at partner universities, These collaborations have allowed for a more assertive presence for academia in the regions, but also of other actors, like the state. The latter have gained the opportunity to be part of more relevant and appropriate initiatives, including proposals for new or better bottom-up public policies. This was the case with the Programme for the Management of the Biosphere Reserve La Sepultura, Chiapas, Mexico, which recognized forage tree planting as a silvo-pastoral system for the payment of environmental services. The achievements of the REDESIVI network benefitted an entire region by improving local livelihood strategies while contributing to nature conservation.

The research agendas are the basis for regionally relevant or even inter- and transdisciplinary research projects of the Competence Centre; they provide topics for and facilitate implementation of research within the joint international doctoral programme, for graduate theses and student team projects on Bsc or Msc level). Research and collaboration agendas had been envisioned for medium or long term, such that smaller student team projects could be integrated into larger research projects. For example, in Chiapas, Mexico, a student research project involved local women to explore and analyse the status of food security in the community. The women concluded that vegetables were needed in their diet and consequently planned the creation of a joint vegetable garden. An agreement was made with the university in which responsibilities of the different members were fixed. The university staff supported the process in series of meetings and with some materials after the available knowledge on vegetable growing was assessed. Now the construction of the garden has started, and also includes the support of men of the village and various authorities. In the implementation phase, the women are encouraged to experiment, and results

will be discussed to motivate further improvements. New students will soon be involved in the process for internship and thesis work to continue supporting this project through various phases. In this way extension and capacity building for local actors are integrated with student research and education activities.

Whereas the majority of collaborative activities in these Latin American research networks take place within the region, there are topics which are also taken up in international working groups allowing for larger research projects funded by international sources. Seed money has been put aside to fund promising ideas within the consortium so that a group of people can send a short concept proposal to the international network steering committee of the project for funds to organise joint proposal writing workshops. This is important for ensuring the continuation of Competence Centre activities into the future. In this way, three joint international project proposals are now being elaborated in the fields of water governance and climate change, multifunctionality of peasant agriculture, and coffee marketing systems. Although the topics arose in the local networks, the elaboration on an international level takes it beyond the scope of local networking activities. This process evolved in the course of the SERIDAR project.

An additional outcome of the activities in the local networks was that contacts established through the course of projects helped identify potential candidates for university studies among vulnerable groups who have difficulties in gaining access to the "academic world". A working group in the SERIDAR network has specifically defined a concept for mentoring such candidates from groups who are at a disadvantage for accessing higher education. On this basis each university has developed concrete mentoring programmes. In FLACSO Ecuador, for example, master students in the Rural Territorial Development programme have accompanied student aspirants from the local networks during preparation for their entrance to the Msc programme. The mentoring continues after the new students are admitted for their studies, such as through targeted courses and support in scientific writing. In a second step the mentees have received support in thesis development and in linkage to the study region where necessary. In this respect, a local actor who was admitted for further studies in the MSc programme relates, "I have taken part in mentoring activities that I find essential and a good guide, before taking the first two modules of the masters. The expectation of the institution that I represent – SEEIC – are high, as I am the first educator of many others who will have the possibility to continue their education in the future, for the benefit of the village which we serve." (Fernando Ordóñez, SEIIC, Ecuador, August 2013).

Analysis and reflection of the network model

As described earlier, the SERIDAR project brings non-academic and academic knowledge systems closer together through a framework designed to establish and strengthen networks that include practitioners and local stakeholders. This also allows for research at the universities to be oriented at demands in their local region. However, the project did not prescribe beforehand how this was to be done; the objectives, conditions, strategies, processes and structures were to be decided upon and developed specifically by the people within each network. This flexibility was necessary but also difficult to handle, and it takes time. At several meetings the liaisons exchanged their views and learning experiences in their respective networks. Here, we reflect on the model established from different viewpoints, taking into account that network composition, members' characteristics, network structure, processes and sustainability are interrelated.

Network composition in relation to members' interests

We have learnt that the design of transdisciplinary network projects should take into account several factors, i. The symbolic weight of the public university in rural areas of Latin America: this institution has been given a social mission to advise and support issues and processes of local

development, for which its presence in the field generates expectations. ii. The interests of distinct actors: each individual brings ideological baggage as well as interests that are both personal and trade-related, which must be reconciled in order to arrive at common goals. iii. The decision-making power of the involved actors: the actors look to academic institutions to resolve local issues that do not necessarily respond to institutional research interests. iv. The need to build and sustain mutual trust: for an institution to build capacity to negotiate its interests, it also needs to be flexible, which means that at times it must respond to requests that are not directly related to a given project but are a prerequisite to achieve its objectives.

Mobjörk (2010) describes different levels of integration which can be found in transdisciplinary research, and that the level of integration may vary during the research process. She concludes that a participatory transdisciplinary approach was effective but much more demanding and time-consuming than a consultative transdisciplinary approach, but it gave a better foundation for the actors involved in future joint learning processes. In relation to this, there is an ongoing debate in the SERIDAR consortium on the role of the university in rural regions, especially on the dividing line between research and consultancy, and on what "real research" is, or whether it should and can be "objective". This controversy is not new for participatory and qualitative research methods. In our case it has led to a situation where even for student team research projects it has become necessary to demonstrate the contribution to broader scientific theoretical debates even where the objectives of the projects focused on tangible outputs for local partners. It is not always easy to maintain the dual focus of educational and research objectives, and to reconcile publication interests of staff with expectations of local non-academic stakeholders in such projects. A common experience of researchers involved in such participatory transdisciplinary projects is that producing outputs in a way that is suitable for practitioners is *additional* (and thus depends on good-will) to the obligations of writing successful academic publications; and that finding resources for it is extra effort, too. We found that this is especially true for doctoral research projects where scholarships do not foresee such intensive user relationships that include development and outreach phases. With regard to research objectives, Wick et al. (2007) have found a tendency to focus research questions on systems knowledge (rather than on target or transformation knowledge) if non-academic actors do not participate in the process of problem identification and structuring. If scientists dominate the project design phase the focus is likely to turn away from the use and users of the outputs. In the case of doctoral students, for example, this is also related to a possible conflict of interests if requirements for graduation set by the university or donor contrast the needs of transdisciplinary research (and specifically the expectations of the local partners).

In general, according to our experience it is necessary to take into account when working with students who originate from the study area and so are themselves also local actors, that these students sometimes run the risk of coming under "pressure in the form of a funnel" that prevents them from advancing their research. On the one hand, there is pressure from the university which may impose inflexible scheduling demands such as a) prior research plans, b) research in which hypotheses are to be analysed on problems identified and c) short periods of time to develop the research. On the other hand, local actors demand that a) research be relevant to the present conditions, b) research resolve identified problems, and c) alignment of the time frame for research with that of local actors. The student must therefore respond to the expectations of these two extremes. In some cases owing to their high degree of commitment to local actors, students may feel *obligated* to adopt the research goals identified by local actors or in other cases may feel *frustrated* for not satisfying the needs of local actors, given that the length of time, costs, and demands set forth by the university preclude longer research processes. In some cases, even the student may wish to investigate topics that do not necessarily coincide with the interests of the local actors. It is important that professors who are thesis advisors understand this and that they

advise students as to how to arrive at a compromise between these two extremes that allows them to advance their projects.

As mentioned earlier, there are few university professors who commit themselves to transdisciplinary work, and those who do have specific research interests and fields of expertise. This has an effect on the problem definition process and thus on the research agendas developed. If e.g. no economists are available in a network, economic or marketing aspects are not likely to be investigated, even if they are central to people's livelihoods. It depends on the people involved – and sometimes even on accidental situations – whether particular experts are actively sought in networking efforts, or whether the networks concentrate on aspects for which there is already sufficient expertise available within. Thus, despite the importance of such topics for ensuring livelihoods and rural development, so far none of the joint activities deal with the design or improvement of e.g. products, services, marketing strategies or companies as means to improve income generation and perspectives for rural youth as target group in rural development, although this might still come at a later step after a longer process of joint learning about intervention options. Experiences from coffee and cocoa boards in Indonesia, bringing together actors from all steps of value chains have shown beneficial results when dealing with topics of common interest like knowledge on methods to increasing product quality, whereas such a team composition did not allow for discussion on economic and marketing aspects where interests of the members clearly contrasted with each other or conflicts prevailed, e.g. smallholder producers versus powerful larger processors or more knowledgeable collectors (Widayat, 2009). This conforms to findings of Wick et al. (2007) that a project dealing with highly controversial issues is not likely to involve all parties concerned. In our cases, the networks have mostly formed through common interests. This helps to consolidate group identity and aids in decision-making for joint activities. Members can discuss what is feasible to them in a complex situation. For example, in a water management committee in Mexico, members are aware that not all their demands towards local government may be realistically achieved, and therefore concentrated their effort on the windows of opportunity identified.

In contrast to the example of Larsson et al. (2009), where research and innovation networks expressly involved companies and private businesses (that also pay membership fees in return to the knowledge and connections gained), the Latin American networks in SERIDAR are mainly composed of members of rural communities or small associations that are seen by the academics to be at a disadvantage (as victims of globalisation, of structural and technological change or of certain governmental policies, for example) and are not expected to become donors. It appears to be the historic embeddedness – external donors with projects coming and going and a focus on development rather than on innovation – that leads to the differences in composition and focus of these networks. Reasons for this are also explained in Sutz (2000) with a focus on the Latin-American research landscape over time.

Network structure in relation to network composition
So far the formation of stable thematic working groups within the networks has been a challenge, also because in some cases, senior researchers have been reluctant to engage themselves for a variety of reasons, e.g. if the topics developed in the network did not merge with their other engagements or if they do not see any gain for their scientific aspirations. Experiences from Sweden show that if clear win-win effects can be experienced and that if specific projects can be regularly developed and funded, such groups can be quite stable with highly satisfied members (Larsson et al., 2009 and personal information). Nettle et al. (2012) argue that while a "bottom-up" focus of innovation was demand oriented and brought engagement with the community, it might lack coordinated research activities around *collective* solutions for the issues at stake. They present experiences with "program teams" in the Australian dairy sector, in which small groups of researchers, extension workers, farmers, policy-makers and service groups are brought together to devel-

op coordinated approaches to address change, being responsible to gather people that can contribute well to the programme development and adaptation. Competent leadership of these groups was seen as essential while ensuring that the group does not fall back into a "science or technology 'push' mental model" (Nettle et al, 2012). From a practical point of view and with our project experiences (see also Hofmann et al., 2009 and 2011) it remains a challenge to find the "right" people for such networks, not only from a disciplinary and logistical point of view, but especially with regard to finding people with a suitable mind-set in addition to the needed methodological and communication-related capabilities. In their comparison of policy instruments for agricultural innovation, Beers and Geerling-Eiff (2012) conclude that facilitated networks – depending on the innovation goal – were the best policy option for achieving system transformation objectives (as opposed to system optimisation), particularly in the invention and business case development phases, especially when "unlikely allies" are included in one network. Facilitated networks are seen as one of several complementary instruments to promoting innovation, in addition to business subsidies, innovation coaches, knowledge vouchers or other.

The way to link ourselves to networks was a defining factor in the establishment of research relationships. In FLACSO Costa Rica or in Chapingo – Chiapas the starting process was faster because of previously existing relationships, and the liaison was well-connected to the researchers or, as in Costa Rica, was a researcher himself. On the contrary, in Colombia it took the liaison two years to link the researchers to the networks created. Overall, the commitment of lecturers, students and the liaison are necessary for the success of the established relationships.

Network processes and methods
It is agreed in the consortium that the process of elaborating research agendas should be participatory, i.e. that local stakeholders also participate in the decision-making e.g. on objectives and expected outputs of the research. However, some colleagues insist that participatory research methods be used throughout the whole research process, which would implicate a reduction in available research methods and might place high demands on local actors. Other members argue that some research objectives could also be served with quantitative or mixed methods, as long as local actors participate in the development of research objectives and as long as the results serve their needs (as argued also by also Muhar, 2006). They also find that these local actors can benefit from international perspectives. Biggs and Smith (1998) discuss an "over-preoccupation with methods". They recognise the great expectations towards the capacity to transform relationships with rural "clients"[68] through Participatory Learning and Action, for example, if applied with the right attitude. They also caution that as PRA and PLA have become widespread in application, people should not be blind for their limitations, and it should be considered in the broader context who is using these methods, how and what for. They argue that the outcomes are determined not so much by the methods used but more by the protagonists and institutions in which the choices are made.

An important challenge for transdisciplinary research is to achieve an equitable and transparent coordination, so that the networks are not dominated by particular actors, e.g. those who contribute more funds or who have a higher education level. In Latin America, the public higher education institutions are still ascribed a fundamental role in coordinating networks through collaborative values.

On the other hand, professors are not always good fundraisers. Scientists who have permanent positions at their institution are not necessarily experienced in and do not feel responsible for applying for external project funding from a variety of donors, especially when larger multi-

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[68] The term „client orientation" has been object to debate due to its economic connotation. This shows that although a constructivist understanding of the joint research is commonly agreed, researchers may still try to maintain an "objective" position.

partner projects are concerned. In SERIDAR delegation of this task to a specific working group in the Competence Centre was attempted although professors' expertise is needed for the formulation of research proposals. It is apparent that the liaisons (*personas de enlace*) cannot be expected to take over the networking for fundraising in addition to their responsibility for local stakeholder networking. This would require a certain overlap of the two groups of actors and in the skills needed to facilitate these processes. In a setting where research funds are not always channelled through open calls for proposals, maintaining relationships to possible donors is a task in itself which requires strong diplomatic skills and a certain common background and demeanour.

Network processes in relation to boundaries
Our model resembles the "bottom-up" experiences of knowledge user-producer relations as described by Sutz (2000). She analyses that such experiences often produce successful results at micro level but have difficulties in broadening the impact of the solutions found. Our efforts to develop joint research projects on an international level for the Competence Centre have recently started: Seed money has been set aside, and groups that have developed a project concept could apply for these funds to organise joint workshops for full proposal elaboration. But how to facilitate the formation of such international thematic groups? This time the process of "up-scaling" locally developed research topics from different countries towards larger common research projects has been rather unstructured as, at least in our case, participation of non-university actors is a challenge and it can be difficult to define concrete shared objectives that are appealing to international donors and at the same time maintain applicability on the local level. Resorting to comparative case studies seems to be a way out for the moment. Again systems knowledge is likely to be the focus and to a lesser extent target or transformation knowledge.

Our difficulties may well be an indicator for a flaw in design of the international Competence Centre: So far its members are only universities and research organisations (because of the conditions of the donor for the project consortium, and the ensuing group dynamics), but still the fundamental orientation of activities should come from the interaction with local stakeholders and practitioners. There is no common understanding of who is "within" and who stays "outside" the organisation, and how the roles of local actors may be reflected institutionally in the Centre without putting excessive demands on them.

Factors of success for collaboration in local transdisciplinary networks
Muhar (2006) has described factors of success for cooperation between universities and regions, some of which are experienced in our networks, too, such as

- The need for long-term orientation of the collaboration: It takes a long time for the trustful relationships to be established, and especially for concrete projects to be defined in sufficient detail. Whereas the problem situation is often explored in various constellations, it is difficult to limit and structure it to problem aspects which can effectively be treated in research and/or learning. And not all aspects are suitable for research – in some cases other actions are needed more than investigations. In addition, conflicts over the direction and priority of change are not uncommon, as stated also by Biggs and Smith (1998) for Participatory Technology Development processes.

- The need for soft skills training: Participatory and transdisciplinary approaches require teamwork and communication as well as analytical skills, and in some cases not only the students but also the non-academic members participate in trainings, e.g. participatory action research methods.

- The need for resources: Participatory processes cost staff time and money, and especially so if the network is situated in larger distance to the university. In the rural Latin American con-

text, workshops with stakeholders might easily take three days whereas in Germany it would be unlikely to unite people for more than half a day. It needs to be found out which donors accept the justification of such resource needs, and how to create an internally conducive environment in the university hierarchy.

- Reward for the engagement of university staff in regional development and outreach: In several partner universities – and despite official announcements on the importance of the extension role of the universities - academic performance is measured in journal publications only, and teaching obligations are high. This means that staff need to engage in transdisciplinary research and education out of their own enthusiasm. Here the SERIDAR project has been especially welcomed as it gave an international reputation to the otherwise singular efforts of professors within their universities. They were now able to receive European Union funding for their activities, including for doctoral research.

Some additional factors have been experienced in our case:

- Win-win situations need to be established reflecting the interests of the different parties, and it needs to be clear to all participants what is defined as success of the collaboration - and how this is made visible.

- Taking advantage of the dynamics in existing networks serves to accelerate the definition phase

- The need for continuous involvement of several professors who personally become part of the networks. They are most likely to guarantee long-term relationships when younger staff might not have a prospects for future employment and advancement at the university. Their research experience may also help identify realistic research designs. This is important to avoid raising high expectations which afterwards are difficult to meet. Personal continuity is a challenge: Relationships are between people, and if staff members leave the university it cannot always be ensured that the knowledge is transferred to successors – making institutional agreements on planned collaboration activities and keeping databases have become the preferred means in our case.

- A complete formulation of medium to long term research and collaboration agendas helps create a continuum of engagement, where the role of professors is to subdivide the process into shorter activities (e.g. for thesis work, student team research projects, etc.) while ensuring the "handing over of the relay"

- The continuous presence of the university in the rural areas and the results elaborated give inputs and ideas for demanding funding for further projects, and create high satisfaction on the side of local stakeholders that are involved.

- Ethical considerations of roles (especially of the university), of personal behaviour and of methods are repeatedly discussed in each team. This assists process definition and contributes to trust-building and ownership. An example is the level of commitment and the raising of expectations on the side of local actors, if it is uncertain how much can really be achieved.

- Students reflect before and after their field work on their experiences and learning – often perceptions of reality in the rural territory are changed and diversified.

Network sustainability
The work in transdisciplinary networks comes with various implications to consider, as it involves higher commitment and resources, financial as well as human, so that the universities may

participate in the construction of joint answers to the problems which have been identified with the various parties. Otherwise, there is the risk that "Pandora's boxes" are opened in the research areas whereby broad activity areas are developed that cannot really be followed up, and then the relationships deteriorate because of disappointed expectations.

Complex or wicked problems require a systems approach to their analysis if effective solutions are to be found. The necessary time horizon and capabilities are not always available, and investigation processes that do not lead to tangible improvements, at least within a medium term, may lead to demotivation, as participants do not see any win-win situation of the collaboration. Inability to identify and visualise successes of the collaboration represents a threat to its sustainability. Biggs and Smith (1998) argue that development coalitions "come together for specific reasons at specific times and later they dissolve". This means in turn that – just like cooperatives – our local networks will dissolve if members find better or more efficient organisational means to serve their interests. Networks are not an end in itself. Pohl et al. (2008) argue that funding, capacity and demonstrated success are three elements central to transdisciplinary research that can form either a vicious or a virtuous cycle and is self-reinforcing. It needs clear criteria for success to be established through high-quality transdisciplinary research methodologies so that funding becomes easier to justify, and more people are attracted - thus increasing research capacity.

The involvement of young people from the communities has proven to increase sustainability of the relationships with the network. In some cases, they chose to apply for studies as a result of the presence of the university in their communities. The mentoring programme of SERIDAR served to support the necessary preparation phase, to amend gaps in knowledge and skills necessary for academic study. These students are now part of both the rural and the academic world and directly support joint activities undertaken in their communities. As mentioned above, the continued attention of permanent academic staff to the network process is vital to ensure that activities follow a logical sequence and contribute to each other in a medium to long-term collaboration strategy.

Conclusions
In retrospect, we can say from the SERIDAR experience that an important lesson learnt is the creation of dialogue on different types of knowledge in order to create space for integrating non-academic knowledge. An example for this is the negotiation of research questions and the establishment of research topics via joint research agendas. This has been an open window to the plurality and the inclusion of different social sectors in the construction of knowledge. Another lesson learnt, but also an important challenge of the work of transdisciplinary research in local networks with multiple actors, is the achievement of an equitable and transparent coordination, so that the local actors do not feel that they are being used by other members with their own particular interests.

The activities developed from various dimensions have taught us that the collaboration in networks for the investigation of real-world problems fosters local empowerment and widens the scope of action in rural areas, as well as the role of higher education institutions there. Our experiences convinced us that the importance of shaping knowledge networks arose from combined research agendas between farmers and academics that recognize the real problems of local actors and the abilities and interests of university research teams. In order for public higher education institutions to undertake transdisciplinary work relevant to networks, there must be a close and horizontal participation with wider social interests, such that a win-win relationship is established among the different parts.

However, to make a structure of such nature really function it is necessary that all actors be aware of the network of which they are part in their different levels, as well as that mechanisms and adequate channels of communication are developed that allow for dialogue and continuous com-

mitment, relevant and useful research for both local actors and academia. In order for public higher education institutions to undertake transdisciplinary work relevant to local, regional and international networks, there must be a close and horizontal participation with wider social interests, such that a win-win relationship is established among the different parts. The dynamic participation and the compromise of professors and students in the research agenda, and researching the construction of alternatives to address identified problems, determine the sustainability of the relationship between university and local actors.

Structures like the Competence Centre should serve to generate funding, also for developing strategies that go beyond research in a way that strengthens local actors and develops capacities. The networks are a vast breeding ground for knowledge generation, but to preserve them, it is necessary to maintain broad research lines that do not marginalise spaces already gained. As postulated by IAASTD (2008) and Armbrecht et al. (2008), policies for institutional development in Latin America should include the development of different types of horizontal and vertical networks among practitioners and with the academic agricultural knowledge system, civil society organisations and political institutions. Furthermore it should support international coordination of programmes and facilitate coordination among the actors involved.

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