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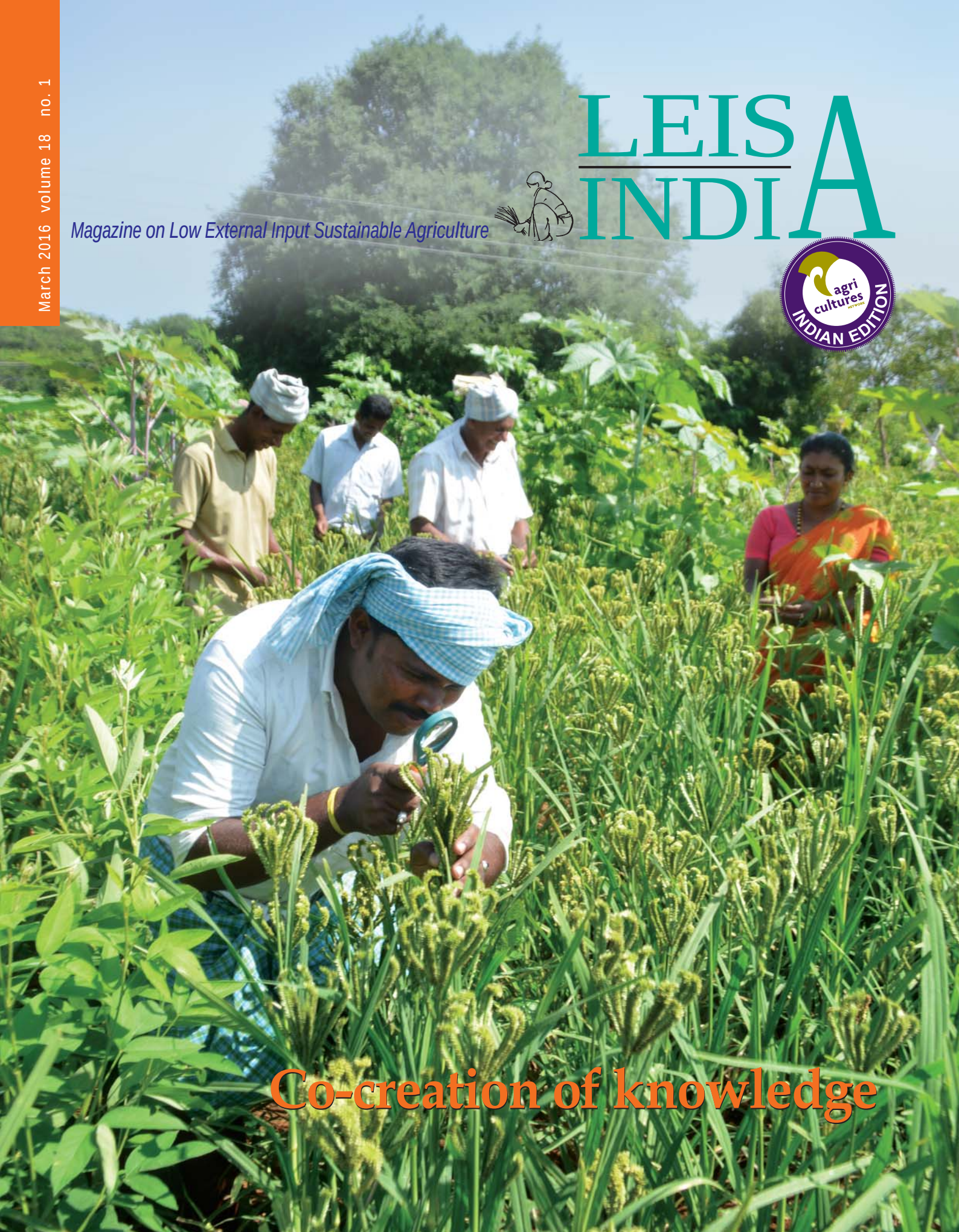

Co-creation of knowledge

LEISA INDIA

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Farmer Field Schools serve as a platform for knowledge co-creation
(Photo: S Jayaraj for AME Foundation)

The AgriCultures Network
LEISA India is a member of the global Agricultures Network. Seven organisations that provide information on small-scale, sustainable agriculture worldwide, and that publish:
Farming Matters *(in English)*
LEISA revista de agroecología *(Latin America)*
LEISA India *(in English, Kannada, Tamil, Hindi, Telugu, Oriya, Marathi and Punjabi)*
AGRIDAPE *(West Africa, in French)*
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Dear Readers

There is increasing realisation worldwide that agroecological approaches is the solution for creating healthy and wealthy nations, providing adequate food, ecological stability and sustainable livelihoods.

Also, there is deep realisation that this knowledge is not entirely new – it has been available as wisdom in farmer communities, is transdisciplinary and interdisciplinary in nature, is not a top down solution, and most importantly, constantly evolving through local adaptation and innovation by farming communities and those closely working with them. This issue examines some of the enabling processes and working strategies for co-creation of and scaling up such knowledge.

International institutions like FAO are highlighting the importance of such processes through regional dialogues and making efforts to influence national policies for creating enabling conditions for this critical knowledge. Hopefully, this issue would inspire intensification of multistakeholder bottom up knowledge creation processes.

We thank all those who are contributing voluntarily for the printed copy of the magazine. We earnestly wish that many more join this group of kind hearted people.

The Editors

LEISA is about Low-External-Input and Sustainable Agriculture. It is about the technical and social options open to farmers who seek to improve productivity and income in an ecologically sound way. LEISA is about the optimal use of local resources and natural processes and, if necessary, the safe and efficient use of external inputs. It is about the empowerment of male and female farmers and the communities who seek to build their future on the bases of their own knowledge, skills, values, culture and institutions. LEISA is also about participatory methodologies to strengthen the capacity of farmers and other actors, to improve agriculture and adapt it to changing needs and conditions. LEISA seeks to combine indigenous and scientific knowledge and to influence policy formulation to create a conducive environment for its further development. LEISA is a concept, an approach and a political message.

ILEIA – the centre for learning on sustainable agriculture is a member of AgriCultures Network which shares knowledge and provides information on small-scale family farming and agroecology. (www.theagriculturesnetwork.org). The network , with members from all over the world - Brazil, China, India, the Netherlands, Peru and Senegal, produces six regional magazines and one global magazine. In addition, is involved in various processes to promote family farming and agroecology. The ILEIA office in The Netherlands functions as the secretariat of the network.

MISEREOR founded in 1958 is the German Catholic Bishops' Organisation for Development Cooperation. For over 50 years MISEREOR has been committed to fighting poverty in Africa, Asia and Latin America. MISEREOR's support is available to any human being in need – regardless of their religion, ethnicity or gender. MISEREOR believes in supporting initiatives driven and owned by the poor and the disadvantaged. It prefers to work in partnership with its local partners. Together with the beneficiaries, the partners involved help shape local development processes and implement the projects. This is how MISEREOR, together with its partners, responds to constantly changing challenges. (www.misereor.de; www.misereor.org)

AME Foundation promotes sustainable livelihoods through combining indigenous knowledge and innovative technologies for Low-External-Input natural resource management. Towards this objective, AME Foundation works with small and marginal farmers in the Deccan Plateau region by generating farming alternatives, enriching the knowledge base, training, linking development agencies and sharing experience.

AMEF is working closely with interested groups of farmers in clusters of villages, to enable them to generate and adopt alternative farming practices. These locations with enhanced visibility are utilised as learning situations for practitioners and promoters of eco-farming systems, which includes NGOs and NGO networks. www.amefound.org

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De-centralsied knowledge service is vital for empowering the knowledge deprived poor people. Aiming to provide contextualised and localised knowledge for the poor communities and developing a channel of reliable information for its various clients, Practical Action-Bangladesh promotes grass root Knowledge Centres called GyanerHaat.

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Conscious of the need to embed agroecology within local and regional socio-ecological realities, the first Multistakeholder Consultation on Agroecology for Asia and the Pacific in Bangkok in November 2015 assessed the contributions of agroecology in a context of climate change, the need to transform knowledge building and research, and made suggestions for policy change, including the creation of appropriate markets to further agroecology in the region.

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Co-creation of knowledge

'Agro ecological farming can double the food production in ten years while mitigating climate change and alleviating poverty', said Olivier De Schutter, the UN Special Rapporteur on the Right to Food, emphasizing the need to shift to more eco friendly farming for future sustainability. This view is also supported by several studies including the IAASTD report. Obviously, the challenge for the 21st century is not only about increasing food production but about strengthening the resilience of our food production in the face of increasing stress on the ecosystem. In this backdrop, agroecological farming is increasingly being recognized as one of the ways in overcoming the challenge.

As an approach, agro-ecology aims to make agriculture economically, ecologically, and socially more sustainable. It is highly knowledge-intensive, based on the know-how of small-scale producers and on agro-ecological science and experimentation.

Need for knowledge co-creation

Food produced adopting conventional agricultural practices largely depends on a set of package of practices which are high external input based, directed towards monocultures. In this system, farmer is considered as a 'recipient' of new knowledge flowing from the lab or the scientists. It fails to account for the complexity of agriculture, local conditions, farmers needs and priorities or farmers increasing need to adapt to the challenges of climate variability. It does not recognize farmers knowledge or their capacities to adopt, while completely ignoring the knowledge of women farmers.

On the other hand, agro ecology is highly context specific and knowledge intensive. It depends on the know-how of small farmers, the agro ecological conditions and experimentation. There are no fixed prescriptions in agroecology about how to produce, process, market or store food, feed, medicine and fibre. Rather, different practices work in different ways depending on each specific context and ecosystem. Farmers continuously build situation-specific knowledge that allows them to succeed under unpredictable and changing circumstances. Agro ecology also needs the support of knowledge based on evolving agro ecological science and experimentation. All this makes co-creation of knowledge, arising out of various forms of knowledge systems, most essential.

Emerging initiatives

Knowledge cocreation has been happening in various ways, especially with the efforts of the Civil Society Organisations. Various participatory processes like Participatory Varietal Selection (PVS), Farmer Field Schools (FFS) and Participatory Technology Development (PTD) have been largely instrumental in co-creating knowledge. Other initiatives include, setting up of village knowledge centers, facilitating knowledge sharing meetings, multi stakeholder workshops etc. This issue highlights some of them.

Farmer Field Schools have been considered an effective platform for co creating knowledge among farmers, facilitators and researchers. Interactions, discussions and hands on training during FFS provides an opportunity to revive and sustain traditional knowledge while making improvements through modern science.(Mohanty and Sahu, p.24).

Science Field Shops similar to FFS, are serving as a response to climate change, in Indonesia. Farmers are learning to prepare and cope with climatic variations better by observing, learning and interacting with other farmers and researchers. (Stigter and Winarto, p.20)

ANTHRA in Andhra Pradesh has promoted preservation of local knowledge on livestock rearing by documenting the practices and wisdom of the tribals, pastoralists and the women in the communities, (Nitya Sambamurti Ghotge, p.14). The collective knowledge created in the form of books, photographs, publications and training materials is aimed to serve as a repository of local knowledge which could be used in future.

In conventional knowledge management system, information control lies with conventionally educated groups. This creates knowledge banks, but not effective 'knowledge societies' that engage poor people. In an effort to move towards creating knowledge societies, Practical Action, Bangladesh has been promoting grass root Knowledge Centre called GyanerHaat, a knowledge service for generating, sharing, updating, disseminating, internalising and conserving knowledge. (Faruk-Ul-Islam, Mohammad Kamrul Islam Bhuiyan, Saikat Shubra Aich, A.M. Shamsuddula, p.6)

With farmers' knowledge gaining more recognition, many events where farmers gather are increasingly serving as platforms for knowledge sharing. PGS (Participatory Guarantee Systems) meetings have been shown to hold great potential, to encourage knowledge sharing between farmers, and thus contribute to nurturing farmers' knowledge. PGS initiatives like Keystone in India and MASIPAG in the Philippines have acknowledged that PGS functions as a key tool in preserving traditional knowledge or even re-establishing already almost-forgotten knowledge and practices. (Cornelia Kirchner, p.9)

Support for knowledge co-creation

Agroecological methods of food production have been applied and spread by many farming communities around the world, primarily through a process of farmer- to-farmer knowledge sharing. The experience of farmers and food-producing communities around the world using agroecological methods has provided a growing body of evidence of the economic, social and environmental benefits of these methods. Successful examples of scaling up agroecology show that there is a need to enhance human capital and empower communities through training and participatory methods that seriously take into account the needs, aspirations and circumstances of smallholders.

Greater investment in research on agroecological food production methods which builds on traditional knowledge and existing best practices is needed. Also increased support for the establishment and expansion of farmer-to-farmer networks at local levels for the sharing of information and best practices in agroecological food production is necessary. Enabling policy environments at national and international levels will go a long way in scaling up agro ecology. The Multistakeholder Consultation on Agroecology for Asia and the Pacific in Bangkok organized by FAO in November 2015 (T M Radha, p.36) is definitely a positive step towards that end.

◆

Participatory processes like FFS enable knowledge exchange

Photo: AMEF

GyanerHaat

The knowledge shop

Faruk-Ul-Islam, Mohammad Kamrul Islam Bhuiyan, Saikat Shubra Aich, A.M. Shamsuddula, Practical Action

De-centralsied knowledge service is vital for empowering the knowledge deprived poor people. Aiming to provide contextualised and localised knowledge for the poor communities and developing a channel of reliable information for its various clients, Practical Action-Bangladesh promotes grass root Knowledge Centres called GyanerHaat.

With the changing context in the environment, farming systems and local-global trade, the value of a knowledge service and role of knowledge centres in the development process is gaining priority. People need more knowledge to act. Access to information alone, perhaps, is not enough.

Currently, there are many types of Knowledge Centres running in Bangladesh, such as, Ministry of Agriculture's AICC – Agricultural Information and Communication Centre, Local Government Division's UISCs – Union Information and Service Centres, Grameen's CICs - Community Information Centres, D-Net's (NGO) *Pally Ththya Kendra*. These are the widely known ones.

Practical Action started promoting grass root Knowledge Centre called *GyanerHaat* (Knowledge Shop) in various locations. This is a knowledge access point having knowledge entrepreneur, ICT internet facility, booklets and 10-20 local knowledge actors (extension agents or service providers). Back in 2000 to 2006, Practical Action, first promoted this kind of Knowledge Centres, attached to local NGOs, managed by paid staff. There were several challenges and it didn't finally sustain beyond the project period, because of the limitations of a project driven approach.

Photo: Practical Action

A woman calling the Krishi Call Centre seeking solution for her field problem

Shifting focus

Recommended by a study (Practical Action, 2007) in 2007, Practical Action, shifted its focus from 'information dropping' to a process of knowledge creation, sourcing, updating, sharing, influencing, internalizing and conserving, at the grassroot level. It established Knowledge Centre with one Union Council and a school where an entrepreneurship model has been explored. By 2008-09, we tried to understand institutional capacity of knowledge management, various contents for clients, role of human knowledge agents for semi-educated clients, an operational model for knowledge centre, which finally evolved into knowledge partnerships and an established Call Centre.

The study

During 2012, a study was conducted in 10 *GyanerHaats* located in northern and southern Bangladesh, to understand the nature of service and its effectiveness. These ten centres were located in six districts of Bagerhat, Jessore, Cox's Bazar, Shatkhira, Sirajganj and Rangpur. The study captured regular monitoring data of the centres, made direct contact with entrepreneurs and Rural Technology Extensionists (RTE) and associated stakeholders such as government line departments, local Union Council representatives. More than 4 informal discussions were conducted in each centre. Some of the most important insights of the study were captured from our 4-5 years' experience in two centres located at Atulia (under Shatkhira District) and Borokhata (under Lalmonirhat district) and two years of working experience of the authors with 10 more centres.

The model

The *GyanerHaats* provide a place where communities can access technical and knowledge services and support. Each *GyanerHaat* has internet connectivity and is managed by a private entrepreneur who charges a small fee for additional services (photocopying, letter writing etc.). Linkage to the wider community is assured through a team of 8-20 Rural Technology Extensionists (RTEs), operating as infomediaries. Having received technical training in agriculture and/or animal health, the RTEs generate their own income by providing technical services and selling inputs, vaccinations etc. It was observed that access to advice, and provision of inputs and services together provided an incentive for the community to utilise the *GyanerHaat* on a continuous basis.

GyanerHaats were established in coordination with a range of partners and in a variety of settings. In our experience, partnership with local government institutions (the Union *Parishad*) and national government agencies, such as the Ministry of Agriculture, provide the greatest potential for long-term viability and impact. *GyanerHaats* based within existing Union *Parishad* (Council) buildings received more visits from the local community and greater support from local government. Practical Action also operated successful *GyanerHaats* attached with a secondary school where the knowledge shop attracted students, their parents and additional farmers through the RTEs and teachers for knowledge information services. As of 2012, Practical Action was managing around 30 Local Knowledge Centres (branded as *GyanerHaats*) as a part of two nationwide programmes.

Box 1: Solve small snail infestation problem in Shrimp pond

Bishwajit Mandal is a shrimp farmer in Shyamnagar. Shyamnagar is an Upazila in the coastal district of Bangladesh, where most of the farming households are engaged in shrimp cultivation, using saline water.

Bishwajit's pond was infested with small snails, which is not suitable for shrimp cultivation. It is necessary to make the water body free from snails before starting shrimp cultivation. He consulted Noorun Nabi, an entrepreneur of the GyanerHaat who in turn introduced him to Taposh Pal, a Rural Technology Extension agent for Fisheries. Based on Taposh Pal's advice, Bishwajit prepared a medicine using tobacco dust and water and spread it on the infected pond. After 4 days Bishwajit Mandal found that all the small snails had died. He was happy to start shrimp farming during that season.

Knowledge interactions

Each centre responded to the enquires of farmers, both at the centre and at the village level, through its Rural Technology Extensionists. The study recorded that each centre could respond to around 1500 -1800 enquires per year, through different means. Maximum enquires were made during face to face visit of the RTEs and some were over phone and at the centre. Most of the enquires were about farm related problems.

Testing water for its salinity content for better pond management in coastal areas

Photo: Practical Action

It was found that a centre could reach around 15-24 villages and 628 people per month (with overlaps) depending on the concentration of clients around number of RTEs attached and also road connectivity. Usually one RTE reached around 100 households which led to a total outreach of 1000 households per center (having 9-10 RTEs). However, from our long working experience in Centre no. 5 (with 20 RTEs) and in a school based centre, the coverage of clients reached up to 2500 households.

One of the unique characters of the centre is its local expert pool of around 20 self-employed rural technology extensionists, one self-employed knowledge entrepreneur with one assistant, in each centre. They are well connected with the government, other NGOs and Practical Action's experts. The centre has a range of farm and non-farm technology booklets, leaf lets, CDs and fact sheets on local solutions.

This apart, the other functions served by the centres were - providing e-services such as – skype, video chat, passport and visa processing, on line birth registration, downloading government forms, job search, sending email etc. Services like photocopying, computer text work, printing, computer training, renting multi-media projector etc., were also found to be very useful.

With varied startup investment cost from $2500 to $12500, a knowledge centre can run on its own, if it can earn $125-200 per month. The operational model does not require project based support. It can run independently following a cost recovery method and local institutional support. This centre can be attached with a rural school, Union Council or a NGO, a Community Based Organization (CBO) or a network.

Conclusion

In conventional knowledge management system, information control lies with conventionally educated groups. This creates **knowledge banks**, but not effective '**knowledge societies'** that engage poor people. A comprehensive knowledge service is about generating, sharing, updating, disseminating, internalising and conserving knowledge. It requires technology, human and institutional support.

The *GyanerHaat* is capable of serving people, mostly from low and medium strata. However, the approach didn't completely exclude the rich. It was found that advice combined with the necessary inputs, skills and services will facilitate action. Therefore, an effective working model combining with advice (information, knowledge), input (e.g. quality seed, vaccine) and service (pushing vaccine, animal treatment) made a big difference in knowledge services. Sustainability of such centres depend upon the capacity of local actors, legal and institutional arrangements and local ownership of the centre. Subsidy may be required for running such a centre in very remote locations.

Box 2: Morjina, a successful goat rearer

Morjina lives near Atulia GaynerHaat. She bought two goats to supplement her husband's petty earnings. Shykul, a livestock extension agent of GyanerHaat provided them with information on how to manage small goat farming including feeding and disease management. In an year, they had three mother goats with five kids, with a market value of around 400 USD.

Morjina Begum a successful goat rearer

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A participatory exercise

Participatory Guarantee Systems

A platform for knowledge exchange

Cornelia Kirchner

The significance and value of local and traditional farmers' knowledge on improving agricultural practices is gaining more and more recognition. Participatory Guarantee Systems have been shown to hold great potential, to encourage knowledge sharing between farmers, and thus contribute to nurturing farmers' knowledge.

Local and traditional knowledge have been denied legitimacy over a long period of time, at least in the western world. Until the 1990s, only scientific knowledge generated by researchers was recognized. This kind of knowledge was transferred mainly in a top-down, unilinear manner from the teaching scientists to the learning farmers.

Today, the relevance of local and traditional knowledge has gained broad recognition. Farmers are no longer seen as passive recipients of information, but their practical experience and knowledge are now recognized and respected as valuable sources of information and means of innovation. Not only in the organic but also in the entire agricultural sector, processes involving various stakeholders in a participatory manner, such as farmer-to-farmer approaches, have been identified as indispensable tools for information dissemination. Farmer-to-farmer approaches have shown to be particularly useful in less industrialized countries among farmers in less privileged contexts.

Organic agriculture, which can contribute to addressing various challenges such as poverty, climate change or biodiversity loss is knowledge intensive. Continuous learning and knowledge dissemination are crucial in order to implement innovations and be able to react to new situations and challenges. Today, there is recognition that organic agriculture needs to be supported by diverse knowledge systems, which draw on both local and scientific knowledge. In order to enhance sustainable agriculture and environmental management, effective ways of exchanging knowledge between farmers and their stakeholders need to be identified.

PGS as a platform for knowledge exchange

Facilitating knowledge exchange can be a challenging task. To make it happen a number of prerequisites need to be fulfilled of which trust is among the most fundamental ones. Only if farmers trust each other will they share their ideas and experience. Important is also the availability of tools and opportunities to meet and to exchange knowledge. It is important to keep in mind that farmers represent diverse attitudes, capabilities and needs regarding the adoption of knowledge. Practices to facilitate knowledge sharing and dissemination have to fit the respective conditions and demands of the farmers.

*Participatory Guarantee Systems (*PGS), by definition, are systems that build on a high level of collaboration and information sharing between the individuals involved. It incorporates many components that can contribute to the creation of a favourable environment for knowledge exchange. Trust, horizontality, shared vision and transparency represent key elements of PGS, which help to create a setting where stakeholders do not feel like competitors, but rather show an attitude of supporting each other. A high level of interaction, knowledge exchange and a continuous learning process are key characteristics of PGS.

The core question behind this paper is whether these ideals as described in the PGS key elements and features are also reflected in reality. Does PGS lead to increased knowledge exchange between farmers? The paper further analyses, which tools are used and provided in the different PGS initiatives, what kind of knowledge is shared and the actual impact on the farmers involved.

The paper is based on quantitative and qualitative data gathered by IFOAM – Organics International from PGS initiatives on all continents. Quantitative data on knowledge exchange was collected during the Annual Global PGS Survey in 2013, a survey that involves all initiatives known to IFOAM – Organics International. From the Global Comparative Study on Interactions between Traditional Social Processes and Participatory Guarantee Systems (PGS), carried out by IFOAM – Organics International between 2011 and 2014, qualitative data from nine PGS initiatives in seven countries on four continents was obtained. This data is complemented by a review of the respective literature, which includes material from past PGS projects implemented by IFOAM – Organics International.

Local knowledge is particularly relevant

PGS initiatives exist in many shapes and contexts. The size of PGS initiatives ranges from less than a dozen of farmers operating in a small regional scale up to national PGS involving thousands of farmers. The existence of an organic regulation and a national plan to support organic agriculture in a country and the stage of development of the organic sector influence the implementation of PGS. PGS can be administered by the farmers themselves, managed by a local NGO or by a wider range of stakeholders. This diversity also applies to the practices of knowledge sharing adopted by PGS initiatives.

All PGS initiatives that participated in the Annual Survey or in the Comparative Study on PGS reported an intensification of knowledge exchange between farmers since the implementation of the PGS. Some PGS initiatives even promote cooperative learning and knowledge sharing as a key benefit of their PGS (e.g. Sapphire Coast PGS in Australia and Sistema ABIO in Brazil). From Nature & Progrès in France, which is the oldest PGS known and was founded in 1964, we learned that the desire to participate in knowledge exchange could be a main motivation for farmers to join the PGS. With regard to Nature & Progrès, it is important to mention that one of the main objectives for the creation of the organization was the establishment of a forum to exchange knowledge on production techniques.

The most common kind of knowledge that is shared between farmers participating in PGS is organic farming techniques and practices, including both traditional knowledge as well as innovations. Local knowledge and experience from fellow farmers that consider the specific characteristics of the soil, the climatic conditions and the market is particularly useful and relevant for farmers. Some PGS initiatives (e.g. Keystone in India, MASIPAG in the Philippines) mentioned that PGS functions as a key tool in preserving traditional knowledge or even re-establishing already almost-forgotten knowledge and practices.

> By working together on different issues, farmers in the PGS network learn and cultivate their knowledge together.

Besides technical farming knowledge being shared between farmers, through joint activities in many PGS initiatives, farmers share their skills and knowledge on other practical issues like marketing or food processing. Through participatory workshops or by working together on different issues, farmers in the PGS network learn and cultivate their knowledge together. They also commonly share and exchange other practical information like suppliers of farm inputs or recipes. Another kind of knowledge frequently exchanged through PGS structure, which is considered complementary to other kinds of knowledge is, specialized and expert knowledge. It is provided either by experienced farmers in the group or specialists (e.g. technicians, scientists) who are also participating in many PGS.

Peer reviews as the most valuable tool for knowledge exchange

The creation of opportunities for farmers to share knowledge is a key strength of PGS. Throughout the initiatives in which data was collected, the regular farm inspections by peer farmers were referred to as the most valuable tool for knowledge exchange in PGS. During the peer reviews, farmers discuss problems and challenges and give advice to each other. Being on the farm and taking time to have a closer look at the applied techniques, allows identification of good practices as well as weaknesses with possible improvements during the visits. It was also mentioned that using a well-created evaluation sheet during the inspection can be helpful in encouraging such discussions.

In many PGS initiatives farmers not only meet for the farm visits, but also hold regular meetings within the local groups. These can be related to specific activities like the election of representatives for the PGS councils, development of a marketing plan or rather an informal socializing and knowledge sharing. The customs differ across the PGS initiatives. In some PGS groups farmers do not come together in such meetings at all, while in some, farmers meet regularly in their small groups. At the minimum, annual meetings are envisioned by most initiatives. In some PGS groups where farmers practice joint marketing or sell their products together at a market, interactions can be even more frequent. In some initiatives where farmers live close together they might even help each other in regular farm work. For example in the Maendeleo farmer group in Tanzania, farmers who live in the same village help each other to build terraces.

PGS meeting in progress

Keystone Foundation began working with indigenous communities of Nilgiri Biosphere Reserve in 1995. Aiming at environment conservation and livelihood enhancement of indigenous communities, one of the primary concerns has been to provide support for marketing organic produce.

Various social processes were established in the local communities such as joint marketing, seed management and conservation, sharing information, techniques and use of traditional knowledge and small-scale savings. The groups consist of both young and old members, which provide a wide scope for mutual learning and respect. PGS served as a platform for knowledge sharing and exchange on various aspects of agriculture such as soil and moisture conservation techniques including water conservation.

The respondents in the survey found that PGS has increased internal interactions and provided space and time for counseling and economic assistance. One of the farmers participating in the Keystone PGS said: *"Traditional knowledge should be transmitted from generation to generation and we see a key role of PGS in this knowledge transmission".*

Apart from regular group meetings, many PGS conduct trainings or workshops. These trainings are often organized to educate new members and to teach them both PGS procedures as well as organic practices. However, it is also common that trainings are organized for all farmers addressing general issues and challenges. Some PGS have established farmer field schools (e.g. Tanzania and India). Other tools that were mentioned by some initiatives to be useful for the promotion of knowledge exchange are online/digital platforms and PGS manuals. Some PGS have an active online presence, using tools like newsletters or online forums to exchange knowledge (e.g. Certified Naturally Grown in the US or Sapphire Coast PGS in Australia). This is particularly important for those initiatives with large distances between the farms and few personal meetings. PGS manuals and procedures were mentioned as beneficial tools for providing guidance to farmers and for exchanging knowledge on efficient PGS implementation.

Wider benefit

Sharing of knowledge is most common and frequent between farmers in the local PGS groups. A number of PGS initiatives report that knowledge is shared not only between farmers in the group, but also with other organic farmers who are not (yet) participating in the PGS and even with conventional farmers who live close by. That is how PGS can take over the important function to increase knowledge and awareness about organic practices in the region. Among other stakeholders who are frequently involved in the PGS, carrying out various roles, and thus participating in knowledge sharing are consumers, NGO staff, traders, government officials, students and representatives from the media. The type and frequency of involvement of these diverse stakeholders differs between the PGS initiatives and depends on how the PGS is arranged, who conducts the inspection visits, how the meetings are arranged and what marketing channels are used.

Farmer empowerment and improved organic techniques

The Global Comparative Study on Interactions between Traditional Social Processes and Participatory Guarantee Systems shows that farmer empowerment is one of the most remarkable benefits of PGS. This empowerment involves personal growth, strengthening of individual self-confidence and an increase in knowledge and skills. Women in particular are directly empowered through PGS, as they receive equitable access to training and technical support. Knowledge sharing between farmers is one core component contributing to this farmer empowerment.

Furthermore, the study indicates that PGS initiatives allow the development of organic practices by acting as platforms for farmer-to-farmer knowledge sharing. At the same time, PGS contributes to traditional knowledge maintenance and dissemination and empowers farmers to make use of locally available inputs and breeds, contributing to improved natural resource management in the communities. The study additionally revealed that joining a PGS contributes to a wider adoption of different organic farming practices, resulting in improved natural resource management within the concerned areas and communities. These practices include: use of traditional seeds and breeding of local species, organic input production and use, tree planting and sustainable agroforestry, increased biodiversity through the incorporation of greater variety of cultivated species, vermicast production, contour plugging and mulching as well as crop rotation etc.

Challenges and limitations

The top-down dissemination of scientific knowledge has been criticized to reach only the privileged, better-educated farmers. While as a result of this study it can be clearly observed that PGS play an important role in facilitating and encouraging knowledge exchange between farmers and that some initiatives are successful in reaching out especially to less-privileged farmers. However, there are also limitations in the reach of information in the different PGS initiatives. Some PGS reported an unequal distribution of knowledge between farmers in their network. In South Africa, for example, it was reported that rural and less-educated farmers

have little involvement in the knowledge sharing processes, as many of them are only involved during the peer inspection of their own farms. This example shows that the reach of PGS is limited and does not always benefit all farmers, equally.

In addition, it is important to keep in mind that all collected data derives from operational PGS initiatives. This means that cases where PGS failed, PGS is unknown or not being considered as the most appropriate model as it is outside the scope of the study. It is possible and likely that there are contexts where success of PGS in facilitating knowledge sharing between farmers is limited. This could be for example in regions where competition of farmers is very high and the willingness to cooperate low. Another example could be a cultural background that does not favour the creation of trust in relationships between farmers and/or other stakeholders. Nevertheless, the result of this study is rather clear: PGS, though not a universal model appropriate for all contexts, can provide useful tools to farmers and has shown to benefit farmers and other stakeholders in many regions of the world.

Core messages and conclusions

Knowledge dissemination is essential for farmers, particularly in the organic sector, in order to implement innovations and to respond to new situations and challenges. Knowledge exchange enables farmers to learn from each other and from past experience. There is much unsatisfied demand from farmers to obtain more knowledge, information and training. This refers to both expert knowledge as well as local/traditional knowledge. Farmers, farming practices, growth conditions and cultural backgrounds are diverse and so are the needs for information, the types of information and information sharing and distribution practices between farmers.

PGS is one tool that can provide a valuable contribution. Being easily adaptable to local conditions, it can create a favourable environment for the sharing of information. It provides a set of tools to facilitate knowledge exchange. While local technical knowledge is the most common knowledge shared by PGS farmers, the setup can be used to exchange various other kinds of information. Knowledge sharing between the farmers in the local groups is most frequent, but PGS also has the potential to integrate a wider range of stakeholders in the process and contribute to an increased awareness about organic practices among consumers and other farmers in the region. Peer reviews were found to be the tool most valued for information exchange between farmers by initiatives around the world. Most PGS initiatives provide and implement a wider range of tools to be used by the stakeholders.

Having a closer look at knowledge sharing practices in PGS is useful for the organic sector, particularly in two regards: firstly, it provides encouragement and inspiration to other PGS initiatives, including the ones that are under development; secondly, most of the tools are not bound to PGS, but can also be adapted and implemented in other contexts. This way, PGS can provide tools to intensify knowledge sharing among farmers, on one hand, contributing to the development of the organic sector and on the other, to the dissemination of good agricultural practices.

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Co-creating knowledge collectively

Nitya Sambamurti Ghotge

Livestock rearing practices have changed enormously in the last 25 years. ANTHRA in Andhra Pradesh has taken initiatives to preserve the local knowledge on livestock rearing by documenting the practices and wisdom of the tribals, pastoralists and the women in the communities, with the hope that they could be used once again when the climate is more favourable.

Twenty five years ago in the early nineteen nineties, agriculture and livestock rearing sustained over 70% of India's population. A large livestock population owned by several million small holders was widely dispersed across the sub continent. Formal veterinary care was limited and could not reach the large number of livestock owners - especially, in villages where there were no roads and could only be approached by boat or by walking for several hours, in villages which had no electricity to maintain refrigerators for storing essential vaccines, in villages with no medical shop for several kilometers to purchase fresh supplies of medicines, in villages with chronic water shortages which made sterilizing equipment difficult.

Despite these limitations, we observed that animals did not die in large numbers as we expected. No doubt there were epidemics of rinderpest and pox to which a large number of animals succumbed, but on the whole, the animals in several villages were lively and healthy and contributed substantially to lives and livelihoods. Exploring further, we stumbled upon large caches of knowledge spread across several domains, both public and private - from the written and codified texts of ayurveda, unani and siddha to the specialized knowledge of healers and finally to the daily practices of the women of tribal and pastoral communities who tended to their animals

> We documented over 500 varieties of medicinal plants for over a 100 conditions affecting animals.

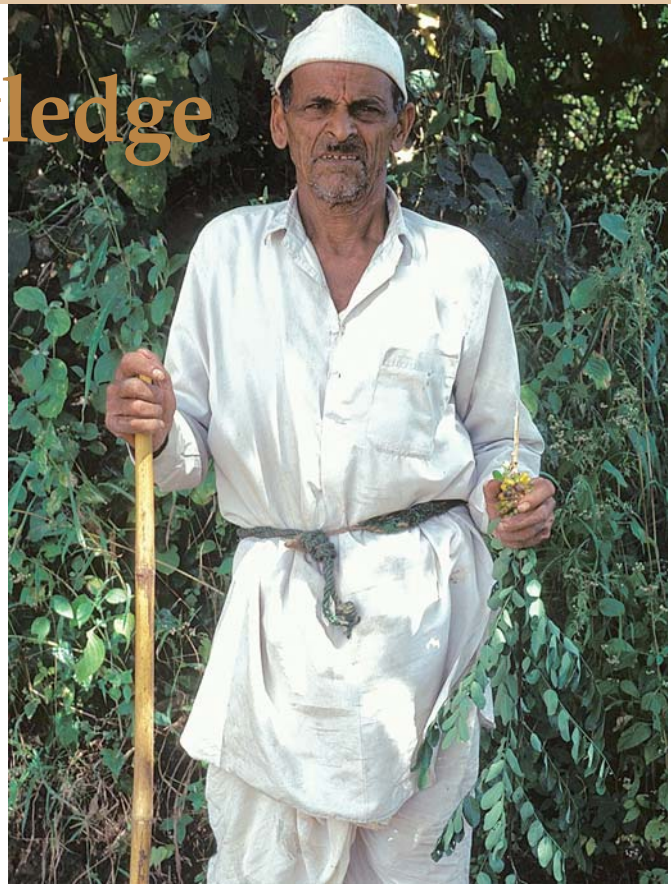

Photo: Author

A livestock healer confident of healing certain diseases

with care and affection. The large body of knowledge on livestock care lay not only in thick text books housed in air conditioned libraries but more so in the every day practices of these livestock rearing communities.

There were practices on important livestock breeds and how the best animals could be selected. Experienced farmers and herdsmen could identify the best animals of different breeds. The knowledge on fodder varieties, grazing areas and grazing strategies was immense. There was a wealth of knowledge on animal health, both preventive and curative. Healers were aware of minute details of plant harvesting and processing. Animal housing practices varied vastly from region to region and across species. We observed ingenious and subtle ways in which different communities coped with challenges of ectoparasites and extreme weather conditions, heat waves and cyclones. The choice of material for roofs, walls and floor were made with careful consideration to the local conditions and problems. Livestock markets hummed with activity and were bursting with a variety of traditional produce.

It was in response to this disconnect between the knowledge of communities and the knowledge taught in universities that the project on Indigenous Knowledge on Animal Health

(IKAH) was born. The project ran for several years documenting, validating and disseminating knowledge on animal health care alongside other similar projects to document people's knowledge and practices. This was also soon after the birth of the CBD (Convention on Biological Diversity) and many groups were eager to document the biological diversity in different regions.

Ground reality

As fresh veterinary graduates, we at ANTHRA, a resource centre offering support in the areas of livestock, biodiversity and people's livelihoods, wanted to address this gap and began a project on training para professionals. We wanted to reach out to tribal groups and pastoralists, landless communities and dam oustees. Most importantly, we wanted to reach the women from these communities with our newly acquired knowledge and skills.

The team members soon experienced that the knowledge learned in the classrooms and laboratories of colleges and universities appear to have little relevance and application in the field. And it is not unusual for a new practitioner, armed with a degree to feel quite disheartened within a few days of commencing work. That is exactly how many of us felt when we first began working with livestock rearing communities in rural India.

Coming from a modern knowledge system, in the beginning, traditional systems appeared to be superstitions and beliefs which had no validity. It is only when we carefully observed and made an attempt to understand these systems, we found out why they existed and what their relevance was.

Initially, 18 village youth, three each from six districts were recruited as animal health workers and were trained to document practices on different subjects. Each month they would be trained by ANTHRA on documentation techniques as well as on the practices to be asked. It was not always easy for them to document, however, frequent visits of other team members, and frequent healers' meetings and group discussions helped.

Our team learnt to observe and document carefully in detail. They also unlearnt the positive bias they had to modern systems of knowledge and became more accepting of other systems.

Documenting indigenous knowledge

This knowledge which existed in practices and not in voluminous texts had to be realized and sustained. We organized healers meetings for the sharing and exchange of knowledge. Contrary to popular perception, healers were happy to share their knowledge at these forums as it also provided a platform for learning new ideas and approaches from others. They shared a common concern that their knowledge did not have the value and respect it had once enjoyed. They were worried that their knowledge would be lost forever when they passed away and were eager to share it with others. Healers are also concerned that their knowledge must not be misused and expressed the need to share it with groups they could trust. Therefore, at all stages we were careful to reassure the healers and others who shared knowledge with us that the knowledge was being recorded not for the personal gain of an individual or a set of

Traditional healers are a repository of local knowledge

Photo: Author

individuals but rather for the benefit of a larger group or community. Village youth were encouraged to apprentice themselves to healers so that they could carefully observe their methods.

Livestock breeds were carefully documented and important traits recorded. Fodder varieties, their use and grazing strategies were documented. We documented over 500 varieties of medicinal plants for over a 100 conditions, affecting animals. The healers, who commanded a great place of respect within the communities, were extremely confident about curing certain diseases. However, they were also honest enough with our group to admit that they were not confident about a few of the diseases. They lacked knowledge and information on vaccinations and immunization schedules. But, they were happy to learn this from our team.

The most appropriate practices were carefully selected using a procedure approved by a multi disciplinary technical committee of veterinarians, botanists, practitioners of ayurveda, anthropologists and sociologists. These were then validated using a protocol specially designed for the study. Housing practices were carefully photo documented and analyzed. We visited livestock markets and documented the activities there.

Almost all of what we documented was knowledge which was not written or documented anywhere. It was passed on from one generation to the other, with the younger generation carefully observing how their elders practiced and learning from them.

Even as we were documenting the knowledge, several valuable species were dwindling as landscapes rapidly changed in response to urbanization and industrialization. We soon realized that with changes in the environment, in policy and in livestock rearing practices as well as the passing away of traditional healers many valuable pieces of knowledge would get lost. There was an urgency to create common pools of knowledge which could be placed on the public domain for easy and open access. Systems of knowledge which combined the best from traditional knowledge systems along with modern science to come with safe, affordable, easy to access and easy to use practices. The team at ANTHRA which consisted of veterinarians, farmers, healers, botanists, scientists, sociologists, computer programmers and development professionals worked collectively to create these pools in a variety of subjects, animal health, feeding, nutrition, housing, management and breeding.

Yet, in a world dominated by skewed patent laws and extractive and exploitative agencies, one had to be careful that this knowledge would not be appropriated by a few dominant groups. We have tried to address this by bringing out publications in local languages so that it is within easy access of rural communities. Training programmes have been held and continue to be held with community based organizations where this knowledge is regularly shared. We are also in the process of creating a digital portal where this knowledge will be uploaded.

Late one night, the buffalo of Nathu Walgude, one of the Animal Health workers, fell ill. It had bloat, a condition seen in ruminants. It was too late to summon a veterinarian and if the animal was not relieved of its distress it would not be possible to milk it in the morning. It was also too dark to venture out and gather herbs. Fortunately, Nathu was part of the team who were then testing dried herbal powders for several diseases. He decided to use the powder made from the dried leaves of black-honey shrub (Phyllanthus reticulatus), to treat his buffalo. He was delighted to see the animal recover very quickly. By morning, he could milk the animal. His father, an experienced farmer was very happy with the results as he had seen many buffalos in the past suffering for several hours.

Livestock rearing practices have changed enormously in the last 25 years. Industrialized systems of livestock rearing have entered and threaten to wipe out small farmers and back yard systems. Livestock production systems, the bio diversity associated with these systems, livestock products and by products, medicinal plants and fodder varieties have slowly and quietly disappeared. Healers have passed on and with them, the knowledge they once held. Grazing lands and pastures have been replaced with super express highways and industries.

We hope the collective knowledge that we have created in the form of books, photographs, publications and training programmes will serve as a reminder of what once was and perhaps one day when the climate is more favorable, some of the systems which have not been irretrievably lost can once again be used for society and the environment.

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"Agroecology is an epistemological revolution"

Interview: Diana Quiroz

Victor M. Toledo is a Mexican ethnoecologist and social activist at the National Autonomous University of Mexico. His work focuses primarily on the study of agroecological and knowledge systems. In this interview, Toledo explains why co-creation of knowledge is an integral part of agroecology and discusses the changes that are needed for this form of agriculture to gain ground in the global arena. He argues that agroecology is in itself a major shift in our relationship with knowledge.

What is the role of knowledge in agroecology?

To answer this question, I would like to recall Alexander Wezel's definition of agroecology. Our French colleague defined it, first, as a science. This is obvious, since agroecology generates scientific knowledge in the strictest sense. However, agroecology, like many other hybrid disciplines (for example, political ecology, environmental history, and ecological economics) is an epistemological and methodological leap that generates new ways of doing science. That is, agroecology is already a new scientific paradigm. It is a politically and socially committed science.

Second, agroecology is also a practice. That is, it involves practical and technological innovation. But this is not technological innovation that arises in research centres, and then is passed on to farmers. No. Here, technological innovation results from both traditional peasant local knowledge and the knowledge of agroecologists, who are usually educated in the academic tradition.

Finally, agroecology is also a social movement. This is seen, for example, in the Latin American agroecology congresses, which are basically encounters between academia, producers, farmers' organisations, and social movements.

Victor M. Toledo

What is the role of the (agroecological) farmer in spaces for social innovation?

I would like to place my answer to this question in the context of the incipient global environmental, social, and economic crisis, and how some Latin American experiences are examples of possible solutions to this crisis.

First, there is the example of Cuba. After the collapse of the Soviet Union, Cuba, who exchanged sugar for oil, was suddenly confronted with a lack of both energy and a market

> Agroecologists engage in an intercultural dialogue that accepts that science is not the only way of looking at, transforming, and emancipating the world.

for its most important agricultural product. The country went through very difficult times. Being forced into self-reliance, people organised themselves in neighbourhoods, city quarters, and cities, and found a way out of the food crisis through agroecology. The conversion to agroecology was so successful that the government had no alternative but to support it. Similarly, the most important farmer movements of Brazil (among them, the Landless Farmers' Movement) are successfully addressing a serious social crisis (land grabbing) also by adopting agroecology as their main paradigm.

Another example that illustrates the role of farmers comes from Mexico and Central America, where farmers use the 'campesino a campesino' (farmer to farmer) methodology. This methodology involves farmers sharing their knowledge to help each other use agroecological principles in local conditions. Also in Mexico, coffee-producing indigenous communities carry millenary knowledge and, I dare say, are the pioneers of organic coffee production worldwide. Because of the interest that this generated among agroecological scientists, Mexican agroecology is recognised to be firmly rooted in the traditions of indigenous Mesoamerican cultures. Their experience has been one of the catalysts of the agroecological movement in the country.

What do agroecological scientists do to contribute to co-creation of knowledge?

Overall, one fundamental principle of agroecology is the recognition of the value of traditional agriculture. Through valuing and learning from ancestral wisdom, innovation emerges. In agroecology we act through what we call a 'dialogue of knowledges'. This has to do with the decolonisation of the mind. Agroecological scientists do not think they know it all (as is the case in orthodox science). They are not like conventional agronomists, who approach peasants with an attitude of supremacy and arrogance. Agroecologists do not teach farmers or producers how things are done. They engage in an intercultural dialogue that accepts that science is not the only way of looking at, transforming, and emancipating the world.

In Latin America, for example, agroecological scientists are being influenced by what is called the 'epistemology of the South'. This is a process of decolonisation from the cultural bias we have inherited from European thought. This is seen in the process of the decolonisation of the mind, where the region's most critical thinkers question paradigms such as 'progress', 'development', and 'competition'. These paradigms are precisely those that support the agroindustrial food production system.

Can you give us an example of an agroecological system created from this 'dialogue of knowledges'?

Take the example of coffee, which is arguably the world's most important agricultural product. Under conventional thinking, market demand drives the modernisation of coffee production systems, that is, growing it as a monoculture and at a large scale, using machinery, pesticides, and agrochemicals. Coffee produced agroecologically, on the other hand, is grown by small farmers. In Mexico particularly, indigenous communities grow non-conventional coffee under shade in highly diversified agroforestry systems. There, a cash crop was integrated in the traditional management of truly anthropogenic forests. In other words, coffee, a relatively new product, was introduced into systems that already existed since pre-Hispanic times.

It is important to stress that agroecology does not try to avoid modernity; rather, it posits an alternative modernity. Not a modernity that destroys tradition, but a modernity that departs from tradition; modernity that respects traditional wisdoms and cultures and that seeks the encounter of knowledge and experiences. Nor can we afford the romantic thought of 'all we have to do is rescue tradition'. Tradition also has its own failures and limitations. This example of agroecological

Farming based on agro ecology sustains crop biodiversity

Intercropping coffee with tomatoes

coffee production is a beautiful case of how the combination of modernity and tradition can generate very advanced systems of food production.

What is needed for this 'dialogue of knowledges' to gain more recognition at universities and research institutes?

First, we must understand that when a dilemma involves two fundamental ways of producing food, a conflict will, of course, arise. In science, agroecology challenges a whole system of research and dissemination of knowledge, thereby generating a battle that takes place at universities and technology and research centres.

However, in my experience of the last twenty-five years, in Latin America there are increasingly more programmes where agroecology is either taught or researched. The force that drives this process is proof that this is not only an epistemological revolution, but also a cognitive and cultural one.

An example of this is that of the Andean region, particularly Bolivia, where an agroecology PhD programme was set up a few years ago by former graduates of the University of Cordoba's (Spain) PhD programme on agroecology and sustainable development. The majority of these new Bolivian graduates are either farmers of Aymara origin or the children of these farmers. This programme was not only the first one of its kind in Latin America, but it is one reputed for its high academic level. In the meantime, agroecology programmes have also started in Honduras, Colombia, and Mexico. I think that agroecology should become as widespread in the world as it has become in Latin America.

> Generating innovation through a dialogue of knowledge has to do with the decolonisation of the mind

Moreover, I should also highlight another especially important counterforce (one which I belong to), that runs in parallel to the agroecological science-practice-movement: ethnoecology. By focusing on traditional knowledge, ethnoecology is expanding the paradigm of mainstream scientific knowledge to one that includes traditional knowledge. This is a force that increases at an impressive rate, especially among young researchers who promote the integration of different types of knowledge for the future of humanity.

What do you think is needed for this paradigm shift to occur at a global scale?

In the coming years we will be entering a period where we will need to define this new paradigm. This will imply that we need to discuss the role of science and research in terms of culture, ethics, and even politics. What we need is a science that responds to a world in crisis, a science that effectively addresses a very significant ecological and social emergency.

We are currently experiencing the breakdown of the great dogmas, of the great myths of modernity, and although we are moving towards replacing them in our discussions, much remains to be done in practice. We must be honest and recognise that although traditional knowledge has gained importance, conventional science still treats the producers of this knowledge as mere objects of study. Through the 'dialogue of knowledges', the researcher becomes involved in the defence of knowledge and starts to accept the need for a new scientific paradigm.

This brings me back to the first question in this interview. The role that knowledge plays in agroecology as a science-movement-practice provides an example of what a paradigm shift could look like. Moreover, the different agroecological experiences in Latin America provide examples of how to respond to this crisis. From this perspective, it can be said that agroecology is, in itself, an epistemological revolution.

Science Field Shops

Learning in response to climate change

Kees (C.J.) Stigter and **Yunita T. Winarto**

Farmers are learning to prepare and cope with climatic variations by observing, learning and interacting with farmers and researchers. Science Field Shops in Indonesia are serving as a response to climate change, facilitating this process successfully.

Science Field Shops (SFSs) have been developed in Indonesia as a better alternative for Climate Field Schools to train farmers and extension intermediaries in tropical lowlands rice production. This is a continuation of response to climate change - a farmer led rural response to climate change. No short term teaching but based on long term field dialogues on climate services for agriculture. SFSs are monthly discussions throughout the year between farmers, scientists and extension staff in which farmers as learners report and compare their measurements and observations, document and analyze on what happens in their individual fields.

This has two faces. For scientists, this new knowledge is traditional and for farmers it is more recent empirical knowledge. Both learnings are used in the co-creation and use of new practical knowledge in the farming environment. In the end, all farmers may be reached in a cascade involving even more farmer facilitators as additional extension intermediaries. The latter, after some time, could be government extension officers and/or farmer facilitators, selected by the farmers from within their groups and trained in additional SFSs.

Considering extension as bringing new knowledge to farmers in SFSs, these additional SFSs simply bring in additional knowledge to farmer facilitators. The new knowledge centered around weather, climate and agriculture is called agrometeorological learning. Defining policy learning as changes in beliefs, attitudes, behaviors, and goals due to (transfer of) new knowledge, agrometeorological learning contains those changes due to (transfer of) new meteorological and climatological knowledge.

Photo: Author

A farmer measures rainfall in his field

Climate change

Climate change is the present driver of environmental pressures, negatively influencing crops, animals and people in farmer communities. From a farming point of view, climate change has three components that make it necessary to consider it as a serious enemy: (i) global warming; (ii) increasing climate variability and (iii) more (and often more severe) extreme events. Over the seven years that we worked with farmers in Indonesia, we observed consequences of these three components with farmers in their fields. Our strategy is to bring in new knowledge for immediate use in co-creating new practical knowledge on-farm, in joint SFSs.

Photo: Author

Science Field Shop

We have learned that we should start our SFSs focusing on the most needed and most recent knowledge on climate change and its consequences for local farming.

Climate services

We distinguish seven initial climate services for agriculture of an organizational kind that bring farmers closer to their ecosystems, threatened by climate change. This includes what causes these changes and what these ecosystems yield under conditions of a changing climate. They are:

(i) guidance on daily rainfall measurements of all participating farmers in their plots

(ii) guidance on daily agro-ecological observations (soil, plants, water, biomass, pests, climate extremes)

(iii) focusing on measured yields and explanations for the differences

(iv) organization of the SFSs

(v) development and exchange of monthly updated seasonal climate predictions in the form of seasonal rainfall scenarios

(vi) delivery of new knowledge related to the above, including the provision and discussion of answers to all agricultural/climatological questions raised by participants throughout the year

(vii) guidance on the establishment of farmer field experiments to get on-farm answers on urgent local questions

Rainfall measurements

It appears that the consequences of increasing climate variability are best understood by exchanging knowledge on daily rainfall measurements by all participating farmers in their own fields. That way they get new knowledge on rainfall variability in time and space and their own field position. Our team produced documentaries on this progress by Rainfall Observers Clubs that had been formed in Indramayu, NW coastal Java, and east Lombok, respectively. We use these documentaries to show and discuss our approach with other stakeholders (government officers in the regions of our farmers, SFS funding organizations, farmer groups with possible interest to participate).

> Daily observations help farmers in knowing their crop ecosystem, giving them earliest indications of unusualness, if any, thus alerting them early.

Agro-ecological observations

Farmers have been observing their agro-ecosystems, but now do so with a daily rhythm. They note their observations on the daily rainfall measurements in their plots, to be discussed in the SFSs. This archiving is a completely new eye opening practice. As our present trials in Indramayu and the Eastern part of the island of Lombok, have shown that these daily observations create an early alertness. What is happening in and with the crop's ecosystem gives them earliest indications of unusualness. They discuss in the field or via SMSs with some of their neighbors and other farmers in the region before an SFS takes place. This way, local early warnings on bad agro-ecosystem developments can be shared in real time and at monthly meetings. This is real progress. For example, communities were prepared better during the floods in January 2014. The prolonged drought caused by El-Nino in 2015 was envisaged but the predictions were not always rationally used. This is part of the learning process.

Measured yields and explanations of their differences

Another major progress we made was to suggest our farmers to anticipate yields from the above ecosystem observations and compare with the actual yields after harvesting. Farmers exchanged views during SFSs about the differences with the comparable (rainy or dry) season last year and differences between them. We expect that the farmers do all this by themselves after some years. We consider this as a part of the continuing learning process using knowledge co-created by the whole team.

Photo: Author

A farmer making observations in his rice field

Organization of the SFSs

Without climate change, the SFSs would have been less necessary. Present weather and climate realities force farmers to rethink their strategies by policy/agrometeorological learning. The scientists participating in SFS are an anthropologist and her students, an agrometeorologist and occasional guests specializing in pests/diseases. The SFSs have particularly become a forum where farming problems and policies are discussed.

Development and exchange of monthly updated seasonal climate predictions in the form of seasonal rainfall scenarios

For more than three years now, the agro-meteorologist has been sharing a monthly "seasonal rainfall scenario" which is spread by SMS among farmers, most often through zone coordinators and farmer facilitators.

We have chosen for an El-Nino Southern Oscillation based prediction from NOAA/CPC (*The Climate Prediction Centre (CPC) of the National Ocean and Atmosphere Agency)* and IRI (*International Research Institute for Climate and Society)* sources. We deliver the scenarios in probabilistic terms of daily life such as rainfall will be below normal, normal or above normal. Absorption and use of this prediction has been steady, but slow.

A questionnaire of early 2015 learned that one of the main reasons is that the "below normal, normal and above normal" terminology appears difficult to grasp. We now pay additional attention to this issue of co-creating acceptable knowledge. A positive result of the questionnaire was that the longer farmers got and used the scenario predictions, the better was their understanding and use that is highly rated as (very) useful.

Delivering of new knowledge related to the above, including the provision and discussion of answers to all agricultural/ climatological questions raised by participants throughout the year

Farmers have many questions about the new knowledge we bring and about the new practical knowledge we co-create. The anthropologist, who has been examining farmers' engagements most of her academic life, replies in first instance during the SFS dialogues. Further questions are delivered in writing and are sent to the agrometeorologist. His responses are discussed, where necessary, during the SFSs. An Australian colleague who occasionally is in Indonesia responds to pesticides related questions. Colleagues from other disciplines (e.g. soil scientist, entomologist, plant breeder) are available. This is the scientific knowledge "shopping" we do in SFSs. Deliberations of their questions in SFS dialogues are highly rated by the farmers.

Guidance on the establishment of farmer field experiments to get on-farm answers on urgent local questions

Simple demonstration experiments were set up in which some farmers were highly interested. Some of them were interested in finding out whether water and biomass could be differently managed to reduce methane emissions without increasing costs for the farmers. A few started to experiment with intermittent wetting and drying that is known to reduce methane emission without increasing costs. Some started to compost rice straw with other waste and use it to co-fertilize their crop instead of ploughing the straw into the wet soil that is responsible for methane emissions.

One farmer also compared yields with and without use of pesticides. In a long dialogue on his results, we came to the conclusion that he had indeed harvested lesser yields to an extent of around 2 tons/ha, when pesticides were not used. The government expects that farmers make the choice of higher yields with pesticides but farmers' health and soil health suffer in the process. This is all another co-creation of new knowledge.

Final remarks

In the coming two years, we will continue training farmer facilitators and other extension intermediaries in Indramayu, Lombok and possibly a few other places. We have developed Roving Seminars on "Science Field Shops with farmer extension intermediaries for climate services in agriculture". We will further develop agrometeorological learning as policy learning of farmers in decision making. We will continue with this co-creation of new knowledge with more farmers by establishing more farmer field experiments to solve local questions. Also the use of new knowledge and co-created knowledge will be tested time and again.

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Call for Articles

Valuing underutilised crops

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As family farming, nutrition and agro biodiversity are increasingly put in the spotlight, LEISA India focuses its attention on 'underutilised' crops. These are plant species that have been used for centuries or even millennia as food, fibre, fodder, oil or medicine, but are no longer very common. Many of these crops are of great value for nutrition, climate resilience and risk diversification. The globalisation of food systems, however, has led to a situation where currently a mere fifteen crops provide 90% of the world's food, with three crops - rice, maize and wheat - making up two-thirds of this total (FAO).

Different factors have pushed the revaluation of underutilised species. In rural and urban communities India, there is a revival of minor millets as nutritious and climate resilient food. Andean chef cooks 'rediscovered' a diverse range of potatoes, beans, tubers, and traditionally used vegetables and grains which resulted in a gastronomic boom that created new markets for small scale farmers. In Africa, the unique properties of crops such as dawa dawa, teff and leafy vegetables receive increased attention through food fairs and celebrations. This calls for renewed attention to underutilised crops by mainstream policy, research and extension, especially as many countries struggle to address malnutrition.

The year 2016 is the International Year of Pulses. Pulses, such as lentils, beans or chick peas are a critical component of a balanced and nutritious diet, and they are important sources of fodder and soil fertility. Therefore, in honour of the Year of Pulses we are especially interested in stories about the revival of pulses.

We are looking for stories that analyse how underutilised crops have been revalued. We seek examples of communities that continued growing and processing them contrary to dominant trends. What were the successful strategies and the challenges to reviving the knowledge and the use of the underutilised crop? How did production, processing and preparation of food change? What role did markets, policy, research or local food and farmers' movements play? What changes did this bring to rural and urban communities? What was the role of youth?

Articles for the June 2016 issue of LEISA India should be sent to the editors before 30th April 2016. Email: leisaindia@yahoo.co.in

Photo: Abhijit Mohanty

A farmer displaying bottle gourd grown on his mixed farm

Farmer Field School

Building knowledge on the farm

Abhijit Mohanty and **Ranjit Sahu**

Farmer Field Schools serve as a platform for mutual learning among farmers and resource persons. Interactions, discussions and hands on training provides an opportunity to revive and sustain traditional knowledge while making improvements through modern science.

Southern districts of Odisha State in India are mostly hilly rainfed uplands with an average annual rainfall of 1200-1400 mm. Tribal communities in these regions practice a combination of forest based livelihoods and shifting cultivation for subsistence food crops which includes traditional millets, pulses, cereals, grams and oilseeds. But, in the last two decades, rampant destruction of forests for various commercial purposes has severely affected the livelihood of these communities. The changing pattern of rainfall combined with persistence of shifting cultivation has triggered extensive soil erosion and siltation in the low lands.

Excessive application of synthetic fertilizers, pesticides and insecticides has reduced the natural fertility of the soil and increased the cost of cultivation. Farmers are in a vicious circle of indebtedness, especially when their crop fails. To make the situation worse, most agricultural development projects launched by the Government in these regions encourage cash crops over subsistence crops – ignoring that the latter is critical to reinforce local economy and ensure food as well as nutritional security of the communities. Indigenous knowledge (IK) of farming and seed resources are now on the verge of extinction due to large scale use of hybrid seed and mono-cropping.

The journey

Agragamee, a grassroot organisation committed for the development of tribal and other marginalised communities of Odisha, has been promoting agroecological models ensuring livelihood, food and nutritional security of the communities and conserving bio-diversity. It has been working with the local communities in two blocks of Kashipur and Thuamulrampur through a knowledge empowering process like Farmer Field School (FFS).

Through a series of interactive meetings with farmers the critical issues of farming were identified and discussed. Several documentary films based on successful agroecology models and the "exposure visits" provided first hand field experience, fostered close interactions and stimulated cross-cultural learning among farmers. These events led to increasing exchange of information and debates on traditional seeds, farming systems, diverse food and their cultural practices.

Co-creating knowledge in farm schools

Farmer's Field Schools (FFSs) established at the village level provided a platform for knowledge building and sharing on agroecology where farmers of 4-7 neighbouring villages meet, interact and find solutions locally. They learn through hands-on training on various topics like indigenous method of soil, water and nutrient management, seeds varieties, crop cultivation, pest control, pasture and fodder management while conserving biodiversity.

By interacting with farmers, many indigenous practices were documented. These were validated through a series of field trials carried out by farmers during the FFSs. Farmers observed the results and are convinced to practice the indigenous practices with some modifications on their fields. For example, traditional practice of mixing neem leaves to stored grains has been modified in FFS to include leaves of karnaj and amari to protect it from fungus and ants resulting in better and longer storage. The entire complex web of information flow is depicted in figure 1 where learning is a multi-directional flow of information and knowledge

Realizing the pressing need to revive these age-old varieties, field trials on selected crops like paddy, millets, pulses, and a host of vegetables were undertaken by farmers. Farmers were involved in seed multiplication of many varieties which are close to extinction, through selection of ideal location

The concept of land-to-lab-to-land approach can be possible only when farmers and scientists work together.

Photo: Abhijit Mohanty

Reviving traditional millets through mixed cropping

for trials, using ecological mapping, and selecting advanced lines.

The exchange of knowledge on agro-ecological experiences during 'Farmers Fairs' brought out systematic analysis of various problems that bother certain classes of farmers. This knowledge exchange helped scientists to understand the factors for success and failure. In turn, they modified the field trials, which is now based on the availability of local resources, farmer's ability and his economic status.

Of the 150 field trials taken up with different highland indigenous paddy varieties like *Matidhan*, *Bodhidhan*, *Pradhan* and *Tippadhan*, *Matidhan* was found to be superior to others in terms of high yield, short duration, pests and disease resistance. Also, its combination with Arhar is superior to other combinations. Farmers also found that in vegetable mixed cropping, *solanaceous* vegetables mixed with *leguminaceae* is superior. Among crop combination of maize and pulses, a second crop of mustard with the residual moisture was successful. Scientists too learnt that involving farmers in field trials helped to convince farmers in adopting superior varieties and follow successful crop combinations.

As women have a sound knowledge of seed preservation, they were involved in setting up Grain-cum-Seed Banks (GCSBs) in 15 villages. Women manage the GCSBs, deciding the amount of seed and selecting the varieties to be stored, resulting in preservation of varieties of paddy, pulses, millets, tubers, and vegetables. Efforts for linking these GCSBs with plant breeding research institutes are on-going.

New learning for farmers

Farmers learnt that pests and diseases thrive in monocultures because of abundance of food and few or no natural enemies. They learnt about crop diversification and the importance of

Photo: Abhijit Mohanty

Women preserve many indigenous seed varieties in the grain-cum-seed bank

including some specific crops to avoid pest occurrence. According to Dr. Debesh Prasad Padhi, a horticulturist associated with Agragamee, "*domestic and wild grasses help significantly to protect the crops by attracting and trapping the stem borers. By including plants like Desmodium in between the rows of maize/sorghum, stem borer will be repelled owing to the chemical emitted by Desmodium.* Scientists realized that a scientific explanation convinced farmers to adopt suitable practices. Farmers are trained and sensitised on various beneficial insects, their role in food production by way of pollination and controlling pest attacks. For example, farmers are happy to see *Ladybird beetles (Coleoptrera)* which feed on soft-bodied pests like *aphids, whiteflies, mites* and *scale insects*, and prevent crop damage.

Similarly, farmers who grew a second crop of mustard with the residual moisture following maize and pulses crop found it rewarding. On the other hand, scientists learnt the decision making process of farmers which is based on need and existing marketing demands.

Farmers are now growing live fencing with plants like *Simarouba glauca*, *Pinnata* and *Cassia tora*, thus enhancing biodiversity and access to fodder and fuel. They are glad that these border plants serve as wind breaks, thus conserving soil moisture.

Need for working together

Agroecological systems are knowledge intensive. They call for in-depth understanding of local conditions for building on the indigenous knowledge already existing with the communities. The concept of land-to-lab-to-land approach can be possible only when farmers and scientists work together, building sustainable linkages. Involvement of farmers in the research process is vital which helps the scientists acquire knowledge about traditional practices and redesign their strategies. The outcome of such a process is not only relevant to farmers but is also sustainable in the long run.

Acknowledgements

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Participatory knowledge building

Vara Prasad Chittem

In an innovative effort to mainstream locally relevant knowledge to promote sustainable agriculture, DDS is building the capacities of the grassroot professionals. In the process, there is a new knowledge being created and exchanged, wherein the scientific basis of local practices are being explored and shared.

The shift towards environmentally friendly farming practices, biodiversity based organic farming and low-external-input sustainable agriculture has made indigenous knowledge a critical resource for sustainable agriculture. There is a growing interest among the development practitioners and farm scientists to take a closer look at the local traditions and build new models based on the strengths of these institutions and technologies. Today, this global phenomenon has uncovered huge treasures of traditional knowledge systems.

Deccan Development Society (DDS) has been working with the poor dalit women farmers in Medak district in Telangana State for more than two decades building their capacities to make a dignified living through sustainable agriculture. While encouraging women to follow their traditional knowledge, DDS has also documented the precious local knowledge for adaptation, demonstration and propagation through demonstrations and trainings.

Recognizing local traditional knowledge

In order to harness traditional knowledge from experienced farmers for further sharing, local traditional knowledge on organic methods of farming has been gathered through interviewing farmers and women farmers of this region and scientific knowledge is applied to the local content. The traditional knowledge from DDS women farmers like Sammamma of Bidakanne, Anjamma of Gangwar and

Anjamma showing the traditional method of seed preservation

Photo: Author

Lakshmamma of Humnapur were identified, documented and enriched with scientific knowledge.

Sammamma, a Dalit women farmer of Bidakanne village has extensive traditional knowledge on eco friendly agricultural practices and cultivating climate resilient crops. Lakshmamma in Humnapur village, a farmer with five acres, has a rare seed-bank of 60 to 70 varieties of native seeds stored in earthen pots. Anjamma of Gangwar, Nyalkal mandal has a rich knowledge on seed storage methods.

The documented traditional knowledge of farmers is supported by scientific explanation, before it is disseminated.

Building capacities

The grassroot level extension personnel play a key role in transfer of agricultural technologies and knowledge to the farming community. But when it comes to eco friendly farming practices, experience has revealed that the farmers themselves hold good amount of indigenous knowledge that improve their livelihoods, but need motivation in adopting such technologies. In this scenario, these grassroot extension personnel simply require the platforms and resources to enable them to enhance their knowledge to act as a channel for sharing information among farmers.

To enhance the knowledge of the grassroot extension workers on facilitating knowledge exchange among farmers on agro ecological way of farming, three-day workshops were conducted during November 2015 in Telangana State. These workshops were organized for agricultural extension personnel of all the 46 mandals of Medak district, in seven batches, at DDS Krishi Vigyan Kendra, Zaheerabad, Medak. Also included were ATMA (Agriculture Technology Management Agency) staff, Indira Kranti Patham (IKP) coordinator and NGO staff directly working with the farmers in the district. The initiative was supported by Agriculture Technology Management Agency, Medak district.

Participatory techniques were used in updating their knowledge. For example, participatory tools were used for identifying the most appropriate organic manures which are economical and locally available, based on certain parameters. Participants were asked to rank the various types of manure. This exercise revealed that the farmyard manure which is easily available in the village is good for soil health, but does not supply adequate plant nutrients and scored 41.

> Experience has revealed that the farmers hold a good amount of indigenous knowledge that improve their livelihoods.

Seed storage method

Ms. Anjamma of Gangawar has a way of storing bengal gram, wheat or peas seeds. First of all the cane basket is sealed with the mixture of cow dung and mud. Then bengal gram pods are filled at the bottom and as the top layer, placing the main seed in between. Later the top layer is filled with neem leaves and sealed with the mixture of cow dung, mud and ash. This prevents the seeds from post harvest damage and losses.

Generally, bengal gram pods are discarded after threshing, but in this case they are used as a preservative medium for seed storage. The science behind using bengal gram pods is that they contain Malic acids which cause irritation to the storage pests. This is how the traditional practices are supported by scientific explanation while sharing with the farmers

The locally prepared liquid bio-fertilizers like Vermiwash, Panchagavya, Jeevamrutham etc., were found to score highest with 91, owing to multiple benefits. Interestingly, inorganic fertilizers, with its potential to supply plant nutrients in large quantity, scored the least with 19. The low score was owing to the fact that they are expensive, locally not available, not eco friendly and do not help in improving soil health.

Overall, 205 extension staff from 12 divisions and 46 mandals, who included the top level agriculture extension personnel, as well, as the grass root level extension staff in the district, were trained on local organic farming methods.

Spreading Knowledge

The trained extension staff took active part in disseminating this knowledge on organic farming among the farmers of the district. And among the organic technologies shared, vermiwash is one technology, which fully caught the attention of the farmers.

This initiative of strengthening the knowledge of agriculture extension staff in the district, has made the institution as the Central Knowledge Hub for biodiversity based organic agriculture. It is also attracting the attention of farmers from other districts.

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Co-creating the agricultural biodiversity that feeds us

The co-creation of knowledge about agricultural biodiversity is an essential part of peasant strategies for survival and autonomy. Facing the threats of the industrial model of production and consumption, peasants and social movements are defending agroecology and their dynamic management of agricultural biodiversity. Together with others, they are building collective knowledge about developing localised, biodiverse food systems, about reclaiming access to their territories and about engaging in research and policy making as principal actors.

Our food is based on a great diversity of plants, animals, fish and micro-organisms. This diversity has been developed through collective knowledge, co-created between food producers and nature. It is the basis of all agroecological production systems. Through working with nature, peasants, including hunter-gatherers, artisanal fishers, livestock keepers, and other small scale food providers have learned about and innovated with ways to enhance and sustain agricultural biodiversity. The first to do so were women who innovated by collecting, sowing and selecting seeds. Food producers shared knowledge, together with their seeds and breeds, with peasants in other territories across countries and continents where, in turn, the co-creation

Ippapally Tejamma, a farmer from India, is surrounded by the agricultural biodiversity that feeds her family

Photo: DDS, India

> Agricultural biodiversity is the manifestation of the creativity and knowledge of peasants as they engage with the natural environment to satisfy their needs

of knowledge greatly expanded agricultural biodiversity suited to diverse ecologies, environments and human needs. The result is the evolution of many hundreds of thousands of different plant varieties and thousands of livestock breeds and aquatic species which have been selected or adapted to serve specific requirements.

Common to the worldviews of many peasant food providers is the belief that all of nature is living and that human beings are part of the family of living creatures and the environment, not outside of it. These worldviews have deep implications for how peasants and other small scale food providers create knowledge. Nature shapes the possibilities of life for human societies. Culture, beliefs and our values, in turn, shape how we take care – or do not take care – of nature. Awareness of the links between nature and culture are explicit in many societies. And in many others, where that awareness has been lost, people are organising and taking action to reclaim this awareness. Humans and other living beings have been engaged in an ancient relationship of mutual interaction, shaping each other's existence, in a process of co-evolution.

This process of co-evolution has created agricultural biodiversity and the agroecological systems it supports. Its dynamic management is an essential part of long-term peasant strategies for survival and autonomy. Agricultural biodiversity is the manifestation of the creativity and knowledge of peasants as they engage with the natural environment to satisfy their needs. It embodies a dynamic and constantly changing patchwork of relations between people, plants, animals, other organisms and nature, continuously responding to new challenges and finding new solutions.

Photo: Patrick Mulvany

Protesting investments in industrial seeds outside the offices of the Gates Foundation, London

Civil Society Delegates deciding their priorities for the Committee on World Food Security

Photo: FAO/Giuseppe Carotenuto

Threats and responses

Agricultural biodiversity, and the creativity and collective knowledge on which it is based, is threatened by the industrial model of production and consumption. In response, peasant societies and social movements are organising locally, regionally and internationally to defend agroecology and regenerate their dynamic management of agricultural biodiversity in the framework of food sovereignty. Together with other relevant actors, for example NGOs and like-minded scientists, they are improving collective knowledge about how to respond.

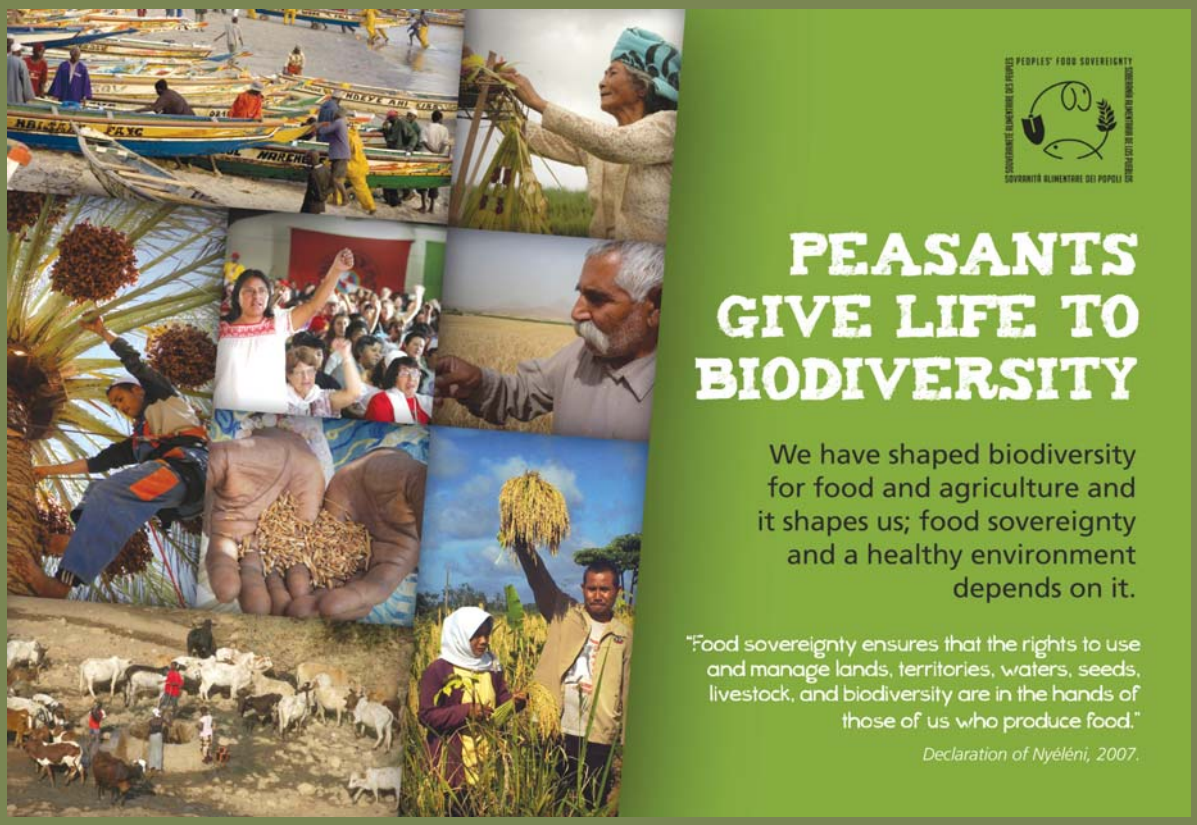
This results in very diverse, multilayered strategies. Peasants are developing their interlinked and localised models of production and consumption and, especially women, are providing biodiverse foods for autonomous food systems and local food webs served by local, and sometimes cross-border, markets.

Peasants are fighting to reclaim access to their territories, migratory routes and fishing grounds. Securing their control over their territories allows them to regenerate agricultural biodiversity, above and below ground and in waters, through, for example, agroecology, agroforestry, artisanal fisheries, community management of mangroves, and mobile pastoralism. In Colombia, for example, peasants are proposing to regain control over their territory and renew a relationship with nature that does not lead to its destruction, as at present. They want food production based on the traditional knowledge of respect for the natural environment, using agroecology. In Palestine, restrictions of access to coastal waters are severely affecting the diverse fishery and the food security of Palestinians in the Gaza Strip.

Peasants are asserting their inalienable rights for collective control over seeds and biodiversity. They are developing *Maisons des Sémences*, supporting peasant seed networks,

Peasants give life to biodiversity

This 16 page brochure is based on a report prepared for the Agricultural Biodiversity Working Group of the IPC for Food Sovereignty. The report titled "Biodiversity for Food and Agriculture: the perspectives of small-scale food providers", is a Thematic Study for FAO's report on the "State of the World's Biodiversity for Food and Agriculture." The brochure, in Arabic, English, French, Portuguese and Spanish, and the fully referenced paper in English, are available. www.foodsovereignty.org/biodiversity.



seed fairs and maintaining diverse breeds of livestock and diverse fisheries. Even in regions degraded by industrial systems, local food providers are re-learning the importance of biodiversity. For example, French bakers cum seed breeders are regenerating varieties of wheat suited to the local environment and artisanal baking, meeting local demands for high-quality breads.

Peasants are producing, and often processing, local foods, feed, fuel and fibre for markets that support biodiversity. Community supported agriculture based on agroecology, and associated processing, can sustain biodiverse production by selling a wide range of varieties of cultivated and wild plants, breeds of livestock and fish species. For example, Andean breeds of alpaca, which produce a diversity of 11 colours of alpaca fibre and are well adapted to the harsh environment, require a supportive market to fend off the lucrative but biodiversity-blind market which demands uniform white alpaca fibre that is subsequently dyed artificially.

Photo: Ilse Köhler-Rollefson

Pastoralists - like this Kuruba shepherd from India - know how to combine food production and care for the environment

Peasants are engaging in research that increases agricultural biodiversity of plants, livestock and aquatic organisms. Their research respects collective rights and encourages the co-creation of diverse knowledges. For example in Iran, evolutionary plant breeding, which is a strategy for rapidly increasing on-farm biodiversity, farmers cultivate very diverse mixtures of hundreds or even a thousand or more of different varieties and allow these to evolve and adapt to their local conditions. These evolutionary populations are living gene banks in their own fields from which seeds from the most adapted varieties and mixtures are used for sowing crops.

Autonomous and self-organised participation in policy formation

Peasants are now included in policy formation. Democratic decision making processes including peasants have now been realised as a result of pressure from peasant organisations. In the UN Committee for World Food Security (CFS), for example, peasants can now debate issues with the same rights to express their views as other actors, including governments. A critical issue under discussion is the oversight of the governance of agricultural biodiversity and agroecology, in terms of their contributions to food security. This is a priority of peasant organisations for the agenda of the CFS. Peasants' representatives are urging similar forms of engagement in the International Seed Treaty and the Commission on Genetic Resources for Food and Agriculture so that they can more effectively champion the policies needed to sustain agricultural biodiversity and realise Farmers' Rights, and challenge policies that serve monopoly interests in the food system.

Peasant knowledge is key, but it must be in dialogue with other knowledges. Yet, recognition by many international and national institutions of the importance of peasant knowledge rarely means giving priority to it. In reality, where multiple knowledge systems are concerned, the supremacy of positivist (modern) science is tacitly assumed by those serving monopoly power. Attempts to incorporate indigenous or peasant knowledge and public or citizen science often include only those aspects that are consistent with positivist science.

Given the substantial economic and political investment in research that undermines the development of knowledge in support of agricultural biodiversity, an urgent issue is to give precedence to the co-creation of knowledge, by peasant producers and other like-minded actors, which will challenge the dominance of positivist science. It is crucial to identify how, together, we can develop the knowledge needed to reclaim research for the public good; to realise changes in governance that will ensure the implementation of research that is directed towards enhancing a wide range of agricultural biodiversity, sustained ecologically in the framework of food sovereignty. This, perhaps, is one of the greatest challenges for the co-creation of knowledge.

This article is based on a report prepared for the Working Group on Agricultural Biodiversity of the International Planning Committee for Food Sovereignty (email: IPC Rome Secretariat - m.conti@croceviaterra.it).

Community Seed Banks
Origins, Evolution and Prospects

Ronnie Vernooy, Pitambar Shrestha,Bhuwon Sthapit (Eds), *2015, Routledge*, 270 p., £29.99
ISBN: 9780415708067

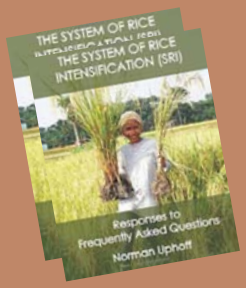
Community seed banks first appeared towards the end of the 1980s, established with the support of international and national non-governmental organizations. This book is the first to provide a global review of their development and includes a wide range of case studies.

Countries that pioneered various types of community seed banks include Bangladesh, Brazil, Ethiopia, India, Nepal, Nicaragua, the Philippines and Zimbabwe. Over time, the number and diversity of seed banks has grown. In Nepal, for example, there are now more than 100 self-described community seed banks whose functions range from pure conservation to commercial seed production.

Surprisingly, despite 25 years of history and the rapid growth in number, organizational diversity and geographical coverage of community seed banks, recognition of their roles and contributions has remained scanty. The book reviews their history, evolution, experiences, successes and failures (and reasons why), challenges and prospects. It fills a significant gap in the literature on agricultural biodiversity and conservation, and their contribution to food sovereignty and security.

The System of Rice Intensification: Responses to Frequently Asked Questions

Norman Uphoff, *2015, CreateSpace Independent Publishing Platform*, 226 p., ISBN-13: 978-1515022053

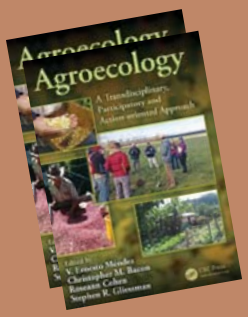


The System of Rice Intensification, known as SRI, represents a paradigm shift in agricultural thinking and practice toward agroecological farming that can be used by even the poorest smallholding farmers in ecologically fragile regions of the world to achieve food security in the face of the climate-change challenges ahead.

When the author Norman Uphoff first learned about SRI in Madagascar in 1993, this production system which offered higher yields with reduced inputs seemed implausible to him. But the professor put aside his skepticism after seeing farmers who had been getting rice yields of just two tons per hectare produce four times more rice—for three years in a row—on their very poor soils, not changing their varieties or relying on agrochemical inputs, and using less water. Now, he's helping to disseminate this dramatically effective methodology with this accessible, easy-to-use sourcebook. It offers explanations, research references, vivid pictures, and concrete examples of the award-winning SRI methodology to anyone interested in the development of practicable sustainable food systems.

Agroecology: A Transdisciplinary, Participatory and Action-oriented Approach

V. Ernesto Méndez, Christopher M. Bacon, Roseann Cohen, Stephen R. Gliessman (Eds.), *2015, CRC Press*, 268 pages, ISBN: 9781482241761



Agroecology: A Transdisciplinary, Participatory and Action-oriented Approach is the first book to focus on agroecology as a transdisciplinary, participatory, and action-oriented process. Using a combined theoretical and practical approach, this collection of work from pioneers in the subject along with the latest generation of acknowledged leaders engages social actors on different geo-political scales to transform the global agrifood system.

The book is divided into two sections, with the first providing conceptual bases and the second presenting case studies. It describes concepts and applications of transdisciplinary research and participatory action research (PAR). Six case studies show how practitioners have grappled with applying this integration in agroecological work within different geographic and socio-ecological contexts.

An explicit and critical discussion of diverse perspectives in the growing field of agroecology, this book covers the conceptual and empirical material of an agroecological approach that aspires to be more transdisciplinary, participatory, and action-oriented. In addition to illustrating systems of agroecology that will improve food systems around the world, it lays the groundwork for further innovations to create better sustainability for all people, ecologies, and landscapes.

Harnessing the Power of Collective Learning
Feedback, accountability and constituent voice in rural development

Roy Steiner, Duncan Hanks (Eds.), *2016, Routledge,* 260 p., £29.99, ISBN: 9781138121126

What were new ideas 30 years ago, such as the concepts of participatory development and systems thinking, are now accepted norms in international development circles. The majority of professionals engaged in rural development accept the proposition that the people who participate in development should play an active role in defining, implementing, and evaluating projects intended to improve their productivity and lives. However this goal remains unrealized in many development programs.

Harnessing the Power of Collective Learning considers the challenges and potential of enabling collective learning in rural development initiatives. The book presents 11 case studies of organizations trying to develop and implement collective learning systems as an integral component of sustainable development practice.

This book is a useful resource for academics, practitioners and policy makers in the areas of international development, sustainable development, organizational development, philanthropy, learning communities, monitoring and evaluation and rural development.

Innovation Platforms for Agricultural Development
Evaluating the mature innovation platforms landscape

Iddo Dror, Jean-Joseph Cadilhon, Marc Schut, Michael Misiko, Shreya Maheshwari (Eds.), *2016, Routledge,* 190 p., ISBN: 9781138181717

Innovation Platforms (IPs) form the core of many Agricultural Research for Development programmes, stimulating multi-stakeholder collaboration and action towards the realization of agricultural development outcomes. This book enhances the body of knowledge of IPs by focusing on mature IPs in agricultural systems research, including the crop and livestock sectors, and innovations in farmer cooperatives and agricultural extension services.

Resulting from an international IP case study competition, the examples reported will help the many actors involved with agricultural IPs worldwide reflect on their actions and achievements (or failures), and find tools to share their experience. Chapters feature case studies from Central Africa, Ethiopia, India, Kenya, Nicaragua and Uganda. Authors reflect critically on the impact of IPs and showcase their progress, providing an important sourcebook and inspiration for students, researchers and professionals.

Participatory Action Research
Theory and Methods for Engaged Inquiry

Jacques M. Chevalier and Daniel J. Buckles, *2013, Routledge,* 496 p., ISBN: 9780415540322

This book addresses a key issue in higher learning, university education and scientific research: the widespread difficulty researchers, experts and students from all disciplines face when trying to contribute to change in complex social settings characterized by uncertainty and the unknown. More than ever, researchers need flexible means and grounded theory to combine people-based and evidence-based inquiry into challenging situations that keep evolving and do not lend themselves to straightforward technical explanations and solutions.

In this book, the authors propose innovative strategies for engaged inquiry building on insights from many disciplines and lessons from the history of Participatory Action Research (PAR), including French psychosociology.

The book contributes many new tools and conceptual foundations to this longstanding tradition, grounded in real-life examples of collective fact-finding, analysis and decision-making from around the world. It provides a modular textbook on participatory action research and related methods, theory and practice, suitable for a wide range of undergraduate and postgraduate courses, as well as working professionals.

Agroecology in Asia and the Pacific

A summary of outcomes of the regional consultation

T M Radha

Conscious of the need to embed agroecology within local and regional socio-ecological realities, the first Multistakeholder Consultation on Agroecology for Asia and the Pacific in Bangkok in November 2015 assessed the contributions of agroecology in a context of climate change, the need to transform knowledge building and research, and made suggestions for policy change, including the creation of appropriate markets to further agroecology in the region.

Photo: FAO

Civil Society delegates deciding on the priorities, to influence the work of FAO and governments, to support agro ecology in Asia and the Pacific region

The relevance and urgency of the agroecological approach is felt acutely in Asia and the Pacific, where the challenge to meet the food and nutritional needs also demands protection of agroecosystems from further degradation and damage. In this region, the Green Revolution helped to increase production, but this was, and still is associated with the destruction of landscapes, soil and water contamination, high farmer debts and loss of traditional farming systems and traditional knowledge. Combined with the challenges of climate change, it is clear that a new agricultural paradigm is needed, and that the search for an alternative approach is vital. Agroecology was brought into the international arena as a pathway out of this situation in 2009 by the prestigious International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD).

Agroecology emerged as an existing but undervalued approach that focuses on the harmony and vitality of natural systems, while improving food security and building the autonomy and agency of family farmers. Agroecology, being knowledge intensive, locally-rooted, and relying on family farmers' management of local resources, demands appropriate support through practice, policy and research at various levels.

From Rome to Bangkok

"Agroecology offers win-win solutions: increased productivity, improved resilience and more efficient use of natural resources" said José Graziano da Silva, Director-General of the Food and Agriculture Organization of the United Nations during the International Symposium on Agroecology for Food and Nutrition Security in Rome, hosted by FAO in 2014. The aim of the Multistakeholder Consultation in Bangkok was to continue and expand upon these discussions in Rome.

The public sector, academia, farmer delegates, and organizations behind social movements from more than twenty countries across the region were present. Following the consultation, they agreed on a set of recommendations to take agroecology forward in the region. Below, we highlight some of the most relevant contributions and suggestions made at the consultation.

Agroecology in the Asia- Pacific region

Various agro-ecological practices have existed in the region, primarily as an alternative to conventional 'chemical-intensive farming based on Green Revolution prescriptions.

These alternatives are often directed at enhancing soil fertility, through organic matter management and water conservation. Throughout Asia and the Pacific, different terms are used for specific practices including: Integrated Farming, Integrated Pest Management, SRI, Conservation Agriculture and agroforestry. Shimpei Murakami of the Asian Farmers Association shared a telling example of yet another name: "Around 3 lakh farmers in 549 villages in Bangladesh are following the *Nayakrishi* method, which includes ten principles of farming that are largely based on agroecology".

Agroecological approaches are being practiced in fishing and pastoralism, embracing similar values underlying agroecology. "*Fishing has a social aspect, a cultural aspect and is also a religion to us,*" said Gilbert Rodrigo from World Forum for Fisher People (WFFP). He stressed that artisanal fisherfolk are very conscious of the need to sustain the aquatic ecosystem as they "*don't cultivate but only harvest*". Pastoralists play a similar role: "*We take care of common resources like grazing lands and mountain lands through sustainable pastoralism, which we have practiced for ages*", said Dinesh Desai (MARAG) from India. Unfortunately, since these lands are increasingly being acquired for non-agricultural purposes, such agroecological systems are under threat, he added.

Social movements and farmer networks in the region, such as La Via Campesina and the Asian Farmers Association seek to amplify agroecology as a path towards food sovereignty. In this light, social movements presented the Declaration of the international Nyéléni Forum on Agroecology held in February 2015, which defines agroecology as not just a set of practices, but rather a political tool to transform society.

Agroecology in the context of climate change

"Agroecology is a powerful tool to reduce greenhouse gases and attain food security", said Vili A Fuavao, Deputy Regional Representative for Asia and the Pacific of FAO. Agreeing that conventional agricultural production causes many problems, especially in a changing climate, participants at the consultation emphasized the positive contributions agroecology can make. Agroecological practices that build primarily on local knowledge and short chains can result in enhanced productivity, food and nutrition security, food sovereignty, biodiversity, more resilient farms and preservation of the environment.

A number of initiatives were discussed through which farmers adapt to the impacts of climate change: farmer selection of hardy varieties for sowing, changing the time of planting, managing water more efficiently, and agroforestry, among others (box 1). These agroecological practices and systems can enable family farmers to continue producing after extreme weather events, and play a role in mitigating the effect of climate change as they increase options for carbon storage through enhanced biodiversity, increased organic content in the soils and reintroduction of trees to the landscape.

The final recommendations of the Bangkok consultation call for greater support of traditional management practices, for local varieties of food crops, and for neglected and under-utilised or drought-resistant crops. Devoting more means to research on the link between agroecology and climate change, with an emphasis on on-farm selection of varieties and species, was also recommended.

Building knowledge in agroecology

Agroecology is highly location specific and knowledge-intensive, so any agroecological strategy must be based on the local know-how, experimentation of family farmers, and may be further supported by science. Knowledge building needs to be decentralised, interdisciplinary and include social technologies, participants stated. Fundamentally, 'people-to-people learning' was identified as key in facilitating the spread of knowledge. Farmer Field Schools (FFS) can be an

Box 1

Adapting to climate change through farmer-led action research in Indonesia

The rice production center of Indramayu is located in the North Coast of Java Island, Indonesia. Long dry seasons, hot temperatures and irregular water availability affect rice production which leads to explosions of pests and diseases and causes slow and stunted crop growth. In response, Ikatan Petani Pengendali Hama Terpadu Indonesia Indramayu (IPPHTI), a local organisation of Farmer Field School alumni, works on an integrated pest management program, while increasing farmers' understanding of the impacts of climate change and developing strategies for adaptation.

IPPHTI facilitates processes in which farmers record their own observations. Currently, hundreds of farmers in 24 sub-districts of Indramayu are observing their rice fields and collecting data on rainfall, pest and disease and plant growth. Their observations are carried out once a fortnight and the data is collected and evaluated monthly as source of information for learning processes. Farmers organise monthly meetings, discuss their observations and problems and arrive at solutions. They develop their own adaptive responses such as selecting varieties based on location, delay in planting time etc. Recently, farmer leaders from 28 districts in Java and Lampung have formed the Gerakan Petani Nusantara (GPN), a national farmers network on agroecology, where the results of this farmer action research are being shared for wider adoption.

effective means to build knowledge at the local level, as voiced by participants. However, participants stated, FFS needs to be reoriented away from the present commodity programs towards the broader concept of agroecology.

Education, and the *way* we educate, needs to be transformed. The present agriculture education system is highly specialised and does not recognise the cross-sectoral nature of agroecology, and the multiple 'ways of knowing'. *"Agroecology is clearly multidisciplinary and transdisciplinary. Understanding such complexity calls for a different type of thinking, a paradigm shift"*, said Damayanti Buchori of Bogor Agriculture University in Indonesia. In order to effectively support agroecology, *"FAO needs to take education more seriously and develop a strategy with a budget for restructuring education extension and knowledge sharing"*, said Wayne Nelles from Chulalongkorn University in Thailand.

Several positive examples of building local knowledge and innovations were presented. One initiative was presented by the International People's Agroecology Multiversity (IPAM), which is an online initiative of Pesticide Action Network Asia-Pacific and provides a grassroots-oriented and network-based alternative educational environment to promote agroecology and related issues in relation to land, agrochemicals, food cultures, food sovereignty, gender equity, and community empowerment.

Participants called attention to the difference between formal and informal education and the need to have public support to complement both models. The informal system is based on the experience and knowledge of the smallholder producers, which is transferred through generations. Informal education is one of the most important vehicles to move agroecology forward in different parts of Asia and the Pacific. This is particularly relevant for women and youth. Protecting future generations as well as women's inherent knowledge, values, vision and leadership, requires proper consideration for the particular needs of women and youth in all agroecological education. The final declaration strongly emphasised the need to recognise, support and document producers' knowledge while designing educational interventions on agroecology.

The role of research

The need for collaboration for knowledge building in agroecology was emphasised. Various speakers advised caution with regard to the sustainability of action research and the potential domination by the scientific agenda over local knowledge. *"The scientific community is new to the concept of agroecology and lacks the culture of working with other partners in development. More openness is required"*, said Abha Mishra from the Asian Centre of Innovation for Sustainable Agriculture Intensification (ACISAI). Research should be based on farmers' needs. It should be location and culture specific and should recognize farmers as co-researchers and innovators. Current research driven by multinational corporations should be replaced with community oriented research that is inclusive and has the agenda of farmers at the center. Hence research should be conducted on the field and not only in University campuses, opined the participants and recommended building a regional network of agroecology researchers, involving civil-society and small-scale food producers, facilitating learning from each other.

The final declaration recommends that agroecology be integrated in the curricula in primary and higher education and in all farm educational programmes, and that content and focus should be derived from the knowledge generated by small-scale food producers.

Agroecology and markets

Markets are both a challenge and a solution for agroecology. It is therefore important to create specific market channels for agroecological products of small scale family farmers. Markets can perform an important role in creating sustainable short value chains for agroecology by making agroecological practices more visible; allowing small-scale farmers to create their own 'brand'; ensuring reasonable selling prices in short chains where middlemen are generally avoided or scarce; and could be used to communicate and promote agroecological practices directly to supportive consumers.

Short chains boost the local economy and ensure that economic benefits remain inside the region. The short value chains are often more sustainable cutting their carbon footprint with less food miles. In addition, they enable consumers to access fresh food that is culturally appropriate and in tune with local food habits. The region has good examples of how markets can enhance agroecological production (box 2).

'Scaling up' agroecology with better policies

Agroecology is, by definition, an innovative, creative process of interactions among food producers and their natural environments. As these innovations often take place on a small scale, achieving wider impact calls for 'scaling up' efforts. This means spreading a way of farming that also implies a transformation in the ways that farming is supported, not just spreading technologies but changing systems.

Some suggestions for scaling up were made in the Bangkok consultation including the following: unlocking ideological barriers to political recognition, supporting farmer-to-farmer networks, funding research and education at various levels, providing an enabling public policy environment, taking specific actions for empowering women, and making strategic alliances with social movements. "*Scaling up ecological intensification from farm to land to landscape requires a lot of social processes and institutional changes*," summarized Rada Kong of the Cambodia Acid Survivors Charity.

In continuous efforts to achieve this, civil society and social movements have been advocating for supportive policies for agroecology. Some of these proposals are articulated in collective declarations like the Colombo Declaration (2010), the Surin Declaration (2012) and the aforementioned declaration of the Nyéléni Forum on Agroecology (2015). "*But not much has been implemented. There is still a lack of supportive public policy in favour of agroecology,*" said Georges Dixon Fernandez of the International Federation of Rural Adult Catholic Movements (FIMARC). Current policies are unsuited for scaling up agroecology, agreed Pham Van Hoi of CARES, Vietnam: "*The present nature of policies is top-down and they are largely influenced by chemical companies. As a result, they are not effective in dealing with the complexity of agroecological production*".

Photo: FAO

Estrella Penunia of Asian Farmers' Association emphasised the crucial role of local level policy support for sustainability of farmer owned enterprises

Box 2

Farmer leadership from production to marketing

In the mountains of Mae Win, Mae Wang of the Chiang Mai province of Thailand, roughly 1,144 families are production and processing coffee while re-foresting the area. The CLUMP Foundation, which stands for Communal Life of Love and Unity of the Mountain People, embodies the hope of returning life and prosperity back to the mountain land through the use of restorative techniques of agroecology and agroforestry. Coffee grows well under big trees, as it benefits from the shade provided by the forest. This new method allowed them to increase the production from 3 TBH per kilo in 2014, to 5 TBH in 2015, and this year, 2016, 8 TBH per kilo. Meanwhile, 25 hectares were transformed into a rich array of life of the otherwise barren highlands. This is why the farmers say: "to grow coffee is to re-forest".

The mountain farmers are involved in all parts of the production and marketing process: from selecting the coffee cherries to roasting, and even selling their organic, high quality coffee throughout Chiang Mai. Their system offers multiple prosperities including a regeneration of the forests, a strong and united community, and an end product Chiangmai is excited to share.

This project was built without any kind of official support or government funding. The farmers now want to take their highland development experience as the model for a new cacao plantation and chocolate production for the lowlanders. They are also preparing the production of pepper as a herb to stimulate the revival of many other local herbs.

Rony Joseph from FIMARC in India listed some specific policy proposals including: greater investments in formal and non formal education of agroecology, identifying and consolidating best practices in agroecology from countries in the Asia-Pacific region, and promoting linkages between farmers to local youth, academia, decision makers, and consumers.

Participants recommended that coherent policy for agroecology prioritising resource-poor environments should be designed and formulated inclusively through a collaborative, participatory process including policy makers, scientists, educators, UN, development partners, CSOs, farmers and farmer organizations. Agroecology should become an integral part of sub-national, national and regional agricultural policies - appropriate legal and regulatory frameworks should be developed. Investments in smallholder food producers should be the priority. Systems and practices of social innovation led by farmers should be promoted to create agroecological territories at community and collective levels.

Photo: FAO

The multistakeholder panel suggested ways to scale up agro ecology in Asia and the Pacific region

Moving forward

"Agroecology will become part of agricultural production systems in the region," assured Dr. Subhash Dasgupta of FAO's Regional Office for Asia and the Pacific. *"We will take these recommendations forward which will serve as a basis to formulate future work plans of FAO, if governments are in agreement,"* he added cautiously. The final document with recommendations is proposed to be presented during the Regional Meeting of FAO member states in April or May 2016.

The participants to the consultation recommended that the FAO Regional Office for Asia and the Pacific further address the question how agroecology can be better supported in national policies and programmes during the upcoming 33rd Regional Conference for Asia and the Pacific. They also proposed that FAO promote agroecology in ongoing regional programmes and initiatives, such as the agroecosystem-based Regional Rice Initiative, the Zero Hunger Initiative and the Blue Growth Initiative. In addition, the suggestion was made to set up a new regional initiative on agroecology that includes a monitoring system of all the activities of FAO and governments in the region in regard to agroecology.

In keeping with the Declaration of the Nyéléni Forum, representatives of civil society reiterated their defense of agroecology as a focal point for structural changes in agri-food systems. In doing so, they reject any attempt to reduce the concept of agroecology to a set of technologies designed to alleviate the harmful impacts of industrial agriculture. They stated that concepts such as "*climate-smart agriculture*" and other similar buzzwords in the international debate must not be confused with agroecology. Agroecology cannot be restricted to organizing a niche market for organic products for a handful of producers and consumers, they said, and added; agroecology will only be successful as the guiding principle for changing current societies and their relationship with nature, if it strengthens smallholder food producers, including traditional and indigenous communities.

The consultation made clear that agroecology is a way of life for family farmers and other small scale producers in Asia and the Pacific. Through agroecology they keep their cultural values alive. Agroecology provides food and nutrition security for urban and rural areas, putting peasants and other food producers at the centre to feed the world in harmony with nature. In conclusion, agroecology contributes to food sovereignty, and their right to define their own food and agriculture systems. The next steps for FAO's agroecology process in the Asia-Pacific region should focus on defining further steps on how to strengthen these key aspects of agroecology as a practice, a science, and a movement focusing on developing strategies to defend it from the threats posed by the industrial agricultural model.

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