Unity for Diversity

agricultural biodiversity community

Sixth Annual Meet

Agricultural Biodiversity and Climate Resilience

Supported by

SwedBio

A programme at Stockholm Resilience Centre

Unity for Diversity

Agricultural Biodiversity Community (abc)

Agricultural Biodiversity and Climate Resilience

Sixth Annual Meet, 14-17 December 2016

Pastoral Centre, Mananthavadi, Wayanad, Kerala, India

PROCEEDINGS

www.agriculturalbiodiversitycommunity.org

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Contents

Background

Agricultural Biodiversity Community (abc) was initiated as part of a joint Hivos and Oxfam Novib Knowledge Programme, Agrobiodiversity@knowledged, initiated in 2011. This Knowledge Programme aims to break through the barriers that limit the scaling up, institutional embedding and horizontal extension of practices that build on agricultural biodiversity for improved livelihoods and resilient food systems. The abc was constituted by diverse organisations and individuals working on agricultural biodiversity with millions of farmers worldwide, where evidence and insights are generated, shared and tested. The knowledge programme aims to synthesise knowledge from a local to a global scale, conduct research on approaches and analytical frameworks that provide new perspectives on agricultural biodiversity and its role in resilient socio-ecological food systems, and improve horizontal and vertical knowledge flows towards positive change and transformation.

- In the first meeting in 2011 held at Thika, Kenya established the state of knowledge around agricultural biodiversity. Identified knowledge gaps, common ground and support needed for the development of abc.
- In the second meeting in 2012 organised at Wongsanit Ashram, Thailand, strong foundations was laid by way of formulation of a shared vision and mission, identification of the five strategic themes for action and joint development of action plans to achieve goals of the community and created platform for communication.
- In the third meeting in 2013 organised in Madurai, India we have evolved tangible knowledge products relevant to abc and beyond and contributed to *Farming Matters Magazine*.
- The fourth meeting held at Boxtel, Netherlands in 2014 focused on creating momentum for change towards agricultural biodiversity at scale by strengthening abc to become a professional action-learning community. It worked towards advancing three themes namely resilience self-assessment, open source seed system, and influencing policy. Also, it focused on engaging with other stakeholders to identify blind spots, reflect and share experiences and perspectives.
- Again in Thika, Kenya abc organised its fifth meet in 2015, which focused on institutionalising abc and strengthening the member base.

Sixth Annual Meet on Agricultural Biodiversity and Climate Resilience

The sixth annual meet was organised in Wayanad, Kerala in India. Forty-seven participants including members of abc, representatives of farmers federations, practitioners attended the meet. Taking cues from the past meetings, the abc focused on the issues, challenges, opportunities and way forward in the context of climate resilience and agricultural biodiversity.

Figure 1: abc Members in the Opening Ceremony

Goals of the sixth annual meet are as follows.

1. Take on board the current and new members of abc and obtain their enthusiastic support for taking abc forward
2. Facilitate exchange and learning on (local, national, regional and international) experiences and reflections on the theme of ***Agricultural Biodiversity and Climate Resilience***
3. Prepare an action plan for 2017
4. Learn about interesting and insightful agricultural biodiversity initiatives in Western Ghats, Wayanad, Kerala, India

The programme started with a field visit to three different organisations namely Community Agro-biodiversity Centre, M.S. Swaminathan Research Foundation, Wayanad Social Service Society, Gurukula Botanical Sanctuary and Cheruvayal Raman's farm. During field visit, the members looked at the biodiversity initiative with the following framework.

- Good and next practices observed in the field and its relevance to agricultural biodiversity and climate resilience.
- Learning drawn out of field visit and potential activities that emerge as takeaway for integration and adaptation.
- Challenges for scaling up, replication and mainstreaming observed practices

A knowledge building workshop was organised on the fourth day of the meet, which focused on learning lessons for future practice from farmers-led agricultural bio-diversity conservation initiative in the context of climate resilience. In this workshop, anchors of the organisations visited, representatives from farmers federations of other parts of the country, practitioners working with the farmers at the grassroots level attended and reflected on the theme.

Members of abc, who visited the bio-diversity conservation initiatives on the first day presented their observations, elucidated their learning, takeaways from the experience and how are they going to integrate them in their work or the overall strategy of their organisations.

abc members visiting Biodiversity Conservation Initiatives in Wayanad, Kerala, India

Gurukula Botanical Sanctuary

Cheruvayal Raman – Custodian of Paddy Varieties

M.S. Swaminathan Research Foundation

Wayanad Social Service Society

Thanal – Paddy Biodiversity Block

Wayanad Social Service Society

On the second and third days, the members worked on the theme of the meet – climate resilience and agricultural bio-diversity, issues, challenges, opportunities and leads for action.

Opening Remarks: M.P. Vasimalai, Chairperson, abc

I welcome all the abc members for this sixth annual meet in Wayanad, Kerala, which is a biodiversity hotspot. This is our second meet in India after our third annual meet in Madurai, Tamil Nadu in 2012. It is a great opportunity to visit institutions that are doing extraordinary work in agricultural biodiversity conservation. We are going to focus on the theme 'Agricultural Biodiversity and Climate Resilience'.

As a network, we have to facilitate knowledge exchange with a greater rigour. We have to make available knowledge resources of each of the member institutions for reaching out to relevant institutions for knowledge whenever we need. We have to complete the initiative of profiling of members of abc. We have to make the knowledge functional and usable.

I would start with a philosophy that we deeply cherish, which is also relevant to all of our work. It is called Gandhian Economic Thought by J.C. Kumarappa.

> If we take the human family, we may divide it into five different groups according to our approach. We can trace them in the ordinary life of even animals. For instance, take one that is most violent and cruel, tiger, which gets its food by killing animals.
>
> Take the monkey. How does it get its food? By picking up fruits and leaves here and there. It gets it by predation. The monkey does not kill the source of its food but takes what is available. These are two methods exemplified by the case of the tiger, and the monkey respectively. There is consumption without production. The first one is *'Parasitic'* and the second one is *'Predatory'*.
>
> Then we come to the third position, where there is a balancing of rights with duties. That is what may be called the *'Enterprising'* stage. You produce and you consume. Look at the abode of the little birds in the house. The bird builds its own nest, unlike the tiger which lives in the caves. It builds its nest where cats cannot get at it, and it enjoys the shelter that it has produced with great effort and forethought. Here is production and consumption.
>
> We have the fourth stage, the *'Gregarious'* stage is that of the bee. When a bee collects honey, what does it do? A bee, when it brings honey, puts it in the honey comb and leaves it to be used by the other bees also. There is an excess of a sense of duty as against a feeling of right. Production is greater than consumption and the surplus is meant for others.
>
> We come to the fifth stage. We mentioned the bird in its nest in the third stage. Supposing it has produced a baby, in the morning it goes out, picks up whatever food, such as grains, is to be found and feeds its young with it. It gives without a thought of any return. It is wholly

motivated by a sense of duty. This is what may be called *'Mother Economy' or 'Service Economy'*.

These are the five types under which we may develop the idea of economic activities, namely, parasitic, predatory, enterprising, and gregarious and the service stages. The principles connected with each one of them will differ. In the parasitic stage, it is all self-centered and right-centered, and consumption takes place without production. In the second stage, it is the same but not so violent. In the third stage, there is production and consumption. In the fourth stage, the gregarious stage, production exceeds consumption. In the fifth stage, it is all service with no thought of any reward.

My second observation is on the focus of this meet, agricultural biodiversity and climate resilience. Some of us may already be working on this theme, and some of us may have just started working on it. There is an interesting piece of news clipping "Accounting for Natural Capital" made available for members to read and reflect *(see Annexure).* We are familiar with agricultural biodiversity and we use this meet as an opportunity to explore climate resilience. One thing I want to stress here is that climate resilience is nothing but risk management. We all know well that agricultural biodiversity contributes to risk management in farming. We need to understand about the connection between these issues. In risk management, there are two aspects viz. risk control and risk mitigation. Insurance is a risk mitigation mechanism. In risk control, there are four areas:

1. **Risk avoidance:** When there is no rain, farmers do not sow the crop to avoid loss.
2. **Risk prevention:** With the certain occurrence of some events, one can take an alternative course to prevent risks.
3. **Risk reduction:** This involves taking some measures to avoid damages caused by the risk.
4. **Risk financing:** Savings and credit are the measures of coping up with the losses caused by undesirable events.

We can fix this risk control framework in agricultural production system as well. Risk mitigation can be done with insurance, which is nothing but risk sharing. Crop insurance is a risk-sharing mechanism to pool the risks. Reinsurance offers space for risk transfer. This risk control and mitigation are very much closer to the issue of agricultural biodiversity and climate resilience. Conserving agricultural biodiversity as well as promoting climate resilient farming requires face many risks.

Thirdly, we have "Collective Capacity", not just one institution or individual, we have a larger pool of capacity. The challenge is how we are going to build on each other's capacity and maximise the collective capacity to achieve extraordinary things. Today in the invocation prayer we had in the morning, we lit candles. What does it show us? The candle sacrifices itself to produce light. Similarly, life is for regeneration. This collective capacity can be built with mutually reinforcing relationships and mutual learning. As a network, how are we going to take this concept of collective capacity forward? In this sixth meet, let us work out principles and mechanisms to realise this. We should not just stop with exchanging tools and methods. We need to set standards and demonstrate ethical work culture.

Fourthly, we are working on three streams. One is 'Demand Stream', the community, community institutions, who are spearheading the initiative; the second one is supply stream, the 'Supply Stream', which includes the government and related institutions. We have to invest in changing their belief systems and attitude by working together. The third stream is 'Enabling Stream' that includes NGOs,

who are involved in building the demand stream to work with the mainstream. In the context of agricultural bio-diversity and climate resilience, we have to understand our roles, rights and responsibilities. Broader understanding on these concepts would help us move sharply.

We see a lot of vibrancy in our network. There is growing interest among institutions to join this network. How do we keep connected and work together is a challenge that needs to be addressed by all of us together. We need to make specialised efforts to bring institutions that are doing outstanding work in agricultural biodiversity into our network. In this meet, we have invited institutions from Bangladesh and Sri Lanka. We would also invite LIBIRD from Nepal, who are doing good work.

Another point, I would like to bring to the forum is how we self-regulate, which is a transformative culture. Initiatives should emerge spontaneously from members without waiting for formal meetings and demand from the secretariat. How do we make this ABC into a self-regulating organisation? We can take clues from Buddhism.

There are three jewels of Buddhism.

Buddham saranam gacchami
Dhammam saranam gacchami
Sangham saranam gacchami

Buddham denotes personification of wisdom and charismatic leadership, whose shelf-life is limited, Dhammam denotes ultimate truth and reality, Sangham denotes community or institution. abc should get into institutional framework and we are still an informal network and we should move towards a greater position. And we should go through the Dhammam, the value system, and we should come out with our statement of ethical and value stand explicitly. Core groups in abc should put all their heads together to take it forward. Let us move forward with more rigour.

We thank Wayanad Social Service Society (WSSS) for their support to conduct this meet here and their arrangements. Also, we thank institutions such as WSSS, MSSRF and Gurukula Botanical Sanctuary, Cheruvayal Raman for sharing their efforts in conserving biodiversity.

We should also thank SwedBio for helping us organise this meet and facilitate regeneration of abc. After Hivos and Oxfam, the support from SwedBio for the next three years would help us strengthen this network further. We can also bring other institutions to support. This meet consists of partners from nine countries and over 45 participants. The fifth meet at Thika has made a strong foundation with new leads for co-creation and let this 6th meet help us generate a lot of functional collaboration in the coming years.

Sonali Bisht & Thomas Mupetesi

Overview of Agricultural Biodiversity Community

In 2011, the Hivos-Oxfam Novib joint knowledge programme agrobiodiversity@knowledged, initiated a journey to build knowledge and experience community of farmers, practitioners and scientists working on agricultural biodiversity. Diverse organisations and individuals working on agricultural biodiversity with millions of farmers worldwide came together to form the abc.

The abc desires a world where agricultural biodiversity is conserved, carefully utilised and continuously developed; a world where **smallholder farmers, pastoralists, fisher folk and forest**

dwellers (men and women) are enabled to contribute to, and benefit from, **biodiversity-based resilient food production systems**; a world where these people, the agricultural biodiversity they manage and their associated socio-ecological systems, are recognised, supported and strengthened and **consumers have access to healthy produce** coming from such farming systems.

The abc aims to break through the barriers that limit the scaling up, institutional embedding and horizontal extension of **people-centered, agricultural-biodiversity-based food production systems**.

The abc works across five priority areas for strategic intervention:

- Seeds, breeds and technology
- Resilient communities
- Policy influence
- Markets and trade
- Information networks

abc works for

- Generating, sharing, and testing evidence and insights on biodiversity involving farmers globally.
- Synthesising knowledge from a local to a global scale.
- Conducting research on approaches and analytical frameworks on biodiversity
- Providing new perspectives on agricultural biodiversity and its role in resilient socio-ecological food systems.
- Improving horizontal and vertical knowledge flows towards positive change and transformation.

Members of abc exchange information, ideas, evidence and insights on changes, successes, failures, challenges, and opportunities for agricultural biodiversity conservation, use and development. Through this exchange, members learn from the experience of people and organisations with diverse disciplinary, geographical and cultural perspectives. We build the evidence base for a transformation towards agricultural-biodiversity-based food production systems and advance action agendas.

Our Journey So Far

abc so far has met five times.

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Again in Thika, Kenya abc organised its fifth meet in 2015, which focused on institutionalising abc and strengthening the member base.

Edith van Walsum: Understanding Resilient Agriculture Vs. Climate Smart Agriculture

Edith van Walsum facilitated a dialogue among the participants to explore the meaning of Resilient Agriculture and Climate Smart Agriculture.

Resilience is nothing but bouncing back after facing a shock. In farming, it is connected with the risks posed by climate change. How far are our traditional farming communities capable of exhibiting this resilience?

There are two perspectives in agricultural production, one is modernised and industrialised production system, which was a consequence of green revolution, and another is alternative, natural, low external input oriented. There are different models in the alternative perspective. We need to understand these two perspectives to decide on our position, to determine where we stand.

There are forces at higher-up in the political arena with very clear and critical perspectives on GMOs. There exists a climate smart lobby, which is working worldwide called GACSA – 'Global Alliance for Climate Smart Agriculture'. If we do not join them, we cannot influence them. That being the thinking, it is good for the people even if they are working with the farmers, seeing what seeds work well at the ground, need not prove that the seeds of GMOs fail to perform, but nevertheless it is important to be aware of things that are going on globally. If we are clear about what is happening, the multinationals can claim their seeds and varieties as climate smart and resilient, we should be careful in dealing with them.

- In Latin America, it is not just agricultural resilience, but socio-ecological resilience. It is not just seeds, breeds or technology, but the social relationships are very important. For example, in a catastrophe that happened in Cuba, which is known for sophisticated social relationship, not many lives were lost; whereas, for a Super Cyclone Katrina that hit USA, despite their sophisticated technology, there were many casualties.
- More than technical and physical, resilience is based in social, cultural and ecological diversity. Resilience is also based on the spiritual value of the community.
- Climate smart approach is a reductionist way of looking at the issue and works on shortcuts. What we need is an inclusive and holistic way of approaching the resilience.
- Resilience promotes diversity of approaches, solutions, models and methods. It works on the principle of evolving with time and is more process oriented.
- Climate smart farming is not just based on one factor of production, say seeds. There are seeds marketed as climate smart, it is not seeds alone that decide the resilience. There is a whole range of other factors that impact the resilience either positively or negatively.
- Resilience farming sees agriculture as an integrated system. At micro level, it deals with issues even smaller than the seeds; it focuses on even micro-organisms in the soil. Resilience is also seen at the farm level, at the community level. For instance, farmers with organised social relationships can deal with the risks with more resilience than the unorganised farmers.
- Climate change is certain and instead of awaiting the damage and adapting to it, we should put in place planning. Climate change could be faced with twin strategies, mitigation and adaptation. We have to follow both these strategies to encounter the issue of climate change. Resilience increases adaptation capacity. While adaptation is not well-defined and understood, resilience gives very clear direction.
- Communities that are exposed to recurrent disasters are more resilient to climate change than the communities exposed lesser to climatic aberrations.
- Mitigation is as important as adaptation. Change has happened because of certain factors. We can follow certain methods to correct it, such as saying no to fertilisers, pesticides, no to food that comes from long distances. Adaptation should not be at the cost of sacrificing some of the essential aspects that impact mitigation in the long run. Adaptation should be in tune with the mitigation.
- How do we convey what is happening at the grassroots level to the policy makers and scientists at the macro level? We need to bridge the gap, as a community, how abc plans to address this gap in our communication capabilities and strategies to communicate to the policy makers. abc should look closer into the issues of resilience in the context of agricultural biodiversity.

Working Groups

Seeds, Breeds and Technology

Issues

- Climate change is a reality everywhere and affects farming in a big way. Due to uncertain weathers, droughts year after year, prolonged dry spells, farmers in many places have lost their seed stocks.
- Traditional and reliable seeds, which the farmers have been using for many years are in short supply and there is also lack of government support to ensure supply of such seeds.
- There is no visibility and support for technologies such as evolutionary plant breeding and participatory varietal selection. Only a few NGOs and interest groups are doing this and there is no support from the state.

What are we doing about it?

- Conservation of traditional varieties and ensuring supply through distribution mechanisms, seed exchange, seed banks.
- Identification of suitable plant varieties for local contexts
- Farmers involved in production and exchange of seeds.
- Local institutions are involved in varietal improvement, seed production and distribution.
- We have been documenting local varieties and knowledge associated with them.

What needs to be done?

- What we have been doing can be continued and scaled up.
- Collaborative works need to be promoted.
- We need to bring visibility and mainstream proven initiatives to gain institutional support.
- We need to start building capacity in evolutionary plant breeding, participatory varietal selection, and participatory plant breeding.

As a network, we can forge an informal collaboration in many of these aspects such as seed exchange, participatory plant breeding, and creating a pool of varieties and seeds. A visit to Thanal's field was planned, where more than 190 paddy varieties are being conserved, and surprisingly there has been a wider awareness among government departments, schools and college, local institutions about the significance of their work and varieties. This shows the need for attracting popular support for the conservation initiative.

All these issues and opportunities indicate the need for building a model. How much do we have among ourselves? We have champions among ourselves. Who are the champions to facilitate and who

are the members or non-members to follow/take support. We should have a plan of action. How do we generate demand?

There are cereals, millets, pulses, oilseeds and greens, whole range of crops, also cattle breeds, and fishes. We should have a clear road map or plan for this year, when we meet next time. We should be able to say we have conserved these many varieties, breeds and so on. How do we consolidate? Otherwise, it should not just remain as an academic exercise.

We can start with collection of what we have been doing on these issues and consolidate them. Then, we can develop a tool to make them systematic. We can provide information that we have and this group can decide how to move forward.

Markets and Trade

Issues of Climate Change on Markets

We have already started witnessing the impact of climate change. The ill effects of climate change such as erratic rainfall, drought, and extreme cold often put pressure on the smallholder farms. Uncultivated crops, lesser known crops, and small millets are unable to cope up with the vagaries of the climate.

Globalisation and climate change are the twin challenges being faced by the small and marginal farmers. For instance, in Sri Lanka, when many of the farmers lost their onion crop completely last year due to prolonged drought, Indian companies exploited the situation by dumping low priced onion and destroyed the local market. The same situation prevailed in India, when it lost onion and cotton crops; China and Philippines swiftly intervened and dumped their produce at cheaper prices. This year, due to drought situation, the pulses crops were lost. The government initiated import of pigeon pea from African countries.

Land grabbing: The issue of climate change has forced the small and marginal farmers to abandon cultivation of land and leave it to fallow. These lands are pooled by the corporates in the name of contract farming. This is the reality in Kenya and Zimbabwe, which also influences the market.

Opportunities

Amidst this gloomy scenario, there are rays of hope. Traditional crops, mixed cropping were found to absorb the ill effects of climate change by coping with the climatic aberrations. For people and institutions working towards promoting such traditional crops, this is an ideal situation to scale-up their interventions.

Popularisation of traditional crops has also brought opportunities for post-harvest processing industries and employment opportunities as many of these traditional crops were being processed manually. We could observe this in Thailand. It opens up new opportunities for the people.

Consumers are increasingly looking for healthy options of food due to increase in their awareness on health and nutrition. It opens up opportunities for both farmers and markets to prepare themselves for changing consumption behaviours of the people.

What is before us?

- Revival of traditional crops and cropping systems.
- Building local markets. In big markets only branded and popular foods are sold and traditional crop produces have no space. We have to build local markets, farmers' markets and village shandies to popularise these products.
- Stop land grabbing in the name of failing farming and climate change.
- Support value addition and agricultural biodiversity
- abc members are working on a few or all these issues depending on the priority of such issues and local contexts. We can build on each other's experiences.
- We should also focus on what are we doing currently on these issues, what are the gaps between our intention and action? As a community, are we going to initiate any programme or campaign to impact policy of the governments to arrest the land grabbing?
- As a community, we can start a few pilots or experimentation on some of the issues raised here. Also, we can enlist the current experiences or models available with us, for e.g., building local markets.
- Another challenge before us is how we scale up the successful models being implemented by our members. Scaling up could be both vertical and horizontal. Vertical scaling-up deals with deepening of models with research and development. Also, proven models could be scaled-up horizontally by replication, adoption and adaptation. For instance, models/works currently being done in Mysore and the Himalayas could be replicated in other places where there is need.

Resilient Communities

General reflections on working group

One focus has been the Communities Self-Assessing Resilience (CSAR) process, but obviously the topic of resilience and relevant activities under the resilience working group is much broader. The theme of this abc meeting provides an opportunity for a 'scoping' exercise with the participants attending the meeting, about whom in the abc is doing resilience related work.

On the CSAR:

- CSAR website http://www.communityresilienceselfassessment.org/ is active and available to use for downloading and uploading resources, and sharing cases or knowledge and insight on agro-biodiversity resilience.
- It would be really interesting to see the experiences of DHAN in implementing the climate resilience work showcased on the CSAR and the abc website.
- It would be great to have abc members link their websites to the CSAR website (under 'About – *Partners'*). So far partners listed include: Hivos, MELCA-Ethiopia, SEARICE, Slow Food Youth, DHAN foundation, Green Net, Canadian Foodgrains Bank. There could also be a link in the abc website under 'Resource Library' for any knowledge products partners wish to share. If anyone would like to add their links to the website they can either do this themselves or contact SwedBio (see next point).
- Everyone should have access to the CSAR website to upload cases themselves. There is also support technically to do this – any abc member who would like to upload any information can contact jamila.haider@su.se or swedbio@su.se.

Future of the website

- SwedBio can commit to the basic functionality of the website and community led assessment.
- If there is more interest in piloting and more hand-on engagement for a larger scale assessment, then we should think strategically about partners to collaborate with who are also doing resilience assessments. In the past years there have been many new and 'large' initiatives and there is a lot of momentum around resilience assessment. In this context, the CSAR can still have a niche, with the most important starting point being that the CSAR processes are community initiated and led. So even in collaborating with others, this should be the most important entry point.
- The website and CSAR process has generated some interest from other organisations. At this point we can provide a platform on the website and if we want more active engagement we should again, as noted above, think about which other resilience assessment partners and initiatives we would like to link up with.

Pointers for Reflection

How well are the d-groups functioning? The resilience d-group is no longer active and it's important to reflect on why. There were attempts in the first year to actively communicate and keep a momentum, but it seemed there was not so much interest or response and it then died out. Maybe there is a more useful way to configure the abc working groups, or maybe they should be revised depending on interest. Maybe it makes more sense to have the themes as underlying

motivation/connectors of the network, but functionally to focus funding and human resources around specific activities or bilateral knowledge exchange processes.

Policy and Communication

There is lack of clarity on the very existence of climate challenge. There are people accepting the phenomenon of climate change and there are people who simply reject the argument of climate change. We have a challenge of communication to change the perception of such people. We have to touch their consciousness and elevate their moral and ethical stand on this issue.

Building alliances between different coalitions working on similar issues is very crucial. There are alliances working for food sovereignty, environment and justice and so on. We have to build trust and confidence with those alliances and initiate real collaboration.

Communication strategy shall be targeted on different stakeholders; there can be communication of policy influence, communication for promoting and improving practices.

Climate change is too technical which mostly remains in the conference rooms and tables of international negotiations. The challenge is how we bring this message down to the farmers with simple communication tools in the way they would understand, relate and get into some action to adapt and mitigate.

Case studies shall come out of the ground, where the farmers talk about the issue of climate change with their personal experiences. Networks like abc should facilitate such communication from bottom up and influence the policy makers with voices of the people.

We have to try to touch the hearts of policy makers. What figures cannot, sometimes stories can do. That is why even after 20+ years of research and volumes of data, still there are differences of opinion in dealing with the issue of climate change.

The language with which the farmers describe this issue is different from what the practitioners and policy makers are discussing. We should also showcase different models of adaptation and mitigation in practice to influence the stakeholders.

Collaboration between ILEIA and abc

We can fundraise together, publish together or systematise our works together.

ILEIA was founded 32 years ago in the Netherlands by a group of people who had creative thinking beyond the mainstream. There is a world famous agricultural university in Wageningen, in the Netherlands. They have produced a lot of scientific research in agriculture. It was at this time in the early 1980s when ILEIA was started, there had been negative fallout of green revolution started in the 60s, which was visible in Asia. The people of ILEIA urged to start working on this, and we were not clear on what solutions. Seeking new solutions

from the same science which created wrong solutions was found to be meaningless. As a new pathway, ILEIA started looking for solutions from the farmers at the ground and the people who are working directly with the farmers with down–to-earth attitude in the semi-arid regions. The central idea was to look for local knowledge and wisdom to find solution to the issues from small scale and indigenous farms. We stared documenting their experiences, which was quite revealing, so that the scientific world would start thinking and act on it. It was a bottom-up type of approach to document the wide range of local knowledge and practices. We did not wish to keep this document in bookshops and we started sharing it and receiving feedback, with a platform not dependent on internet, but we started a media called LEISA, Low External Input for Sustainable Agriculture. If we look at the issues of LEISA, we can understand the current issues of agro biodiversity talked about widely in other media, but with a difference.

Uniqueness of the magazine is that it is not just someone sitting in an office to collect some information, putting it together and sending it out. It is completely grounded in practice, where it provides space for the farmers, practitioners and scientists to contribute knowledge on agriculture. We are publishing four issues in a year, once in a quarter. Once in a year, all the partner organisations meet to reflect on key issues and work out themes for the coming year. Then, we start working on them. We invite articles from people we know and do not know. For instance, for the theme of climate change, we received an article from Iceland. It is a didactic process, where we facilitate the authors to produce an article. We help them to put their thoughts and experiences together in writing, which is a problem among many of the practitioners today.

Now, our magazine is getting more and more digitalised. More than 90% of our readers are accessing our magazine online. We have reached a huge number of people in USA whom we had never met before. There seems to be an interest. It is always better to reach a larger community to influence different sections of the community towards the issues of climate change.

Apart from ILEIA, LEISA India, we have two partnerships in Africa, one in Senegal and another in Ethiopia – MELCA, who is also a member of abc. There are two partners in Latin America; one in Peru and another in Brazil. We are also planning to set up a European wing.

In Agricultures Network, we are interested in building an alliance with abc. We can start with doing something together; then we can start planning for the next steps. To begin with, we can have two starting points.

1. We can have an exclusive issue on Farming Matters
2. abc takes two pages of every issue of Farming Matters to feature matters on Agricultural Biodiversity.

Exploration for collaboration between ILEIA and abc was started a few years back and Edith attended the meet in Thika, Kenya and contributed actively to discussions. SwedBio helped these two networks to come together and start working. It should be a mutually reinforcing collaboration. In the coming year (2017), we can have a formal collaboration.

Suggestions for Collaboration between ILEIA and abc

- ILEIA has developed capacity to train people in documentation and synthesise knowledge from practice and put it in a systematic documentation. It can offer this capacity building to members of abc.
- ILEIA can help abc to organise workshops/write-shops to generate knowledge products.
- We can have joint publications and reach out to a larger audience.
- It is a great opportunity for visibility. abc will have its own communication materials, for which ILEIA can provide capacity building programme for its members.
- We have to identify a few products/concrete areas of collaboration, and keep each other's identities clear.
- We can generate articles from our experiences, which can be edited and developed into publishable form, either as Farming Matters or publications of abc.
- We can commission certain documentations/publications of members' experiences and models across the countries.
- abc can set up internal mechanisms for documentation and publication, which can be supported by ILEIA through capacity building programmes and joint publications.
- One day of our annual meet could be earmarked and announced well in advance for writing and contributing communication materials, stories, case studies, and concept notes.
- We need to organise capacity-building programmes for grassroots-level reporters to write about experiences at the ground. The grassroots workers can work on systematic documentation of their experiences, which can help bring visibility not only to their work but also to the issue itself.
- Both ILEIA and abc have unique strengths in working at the grassroots; combining strengths of both the networks, we can bring out a joint magazine as well. We can work on the theme of Climate Change and Agricultural Biodiversity for the magazine.
- In March 2017, Agricultures annual meet was organised in Ethiopia. If two members from abc participate in the meet, it would help exchange our ideas and get into deeper understanding of each other's work.

These ideas could be taken up for discussion in the steering committee meeting of abc and we can work out concrete areas of collaboration.

Way Forward

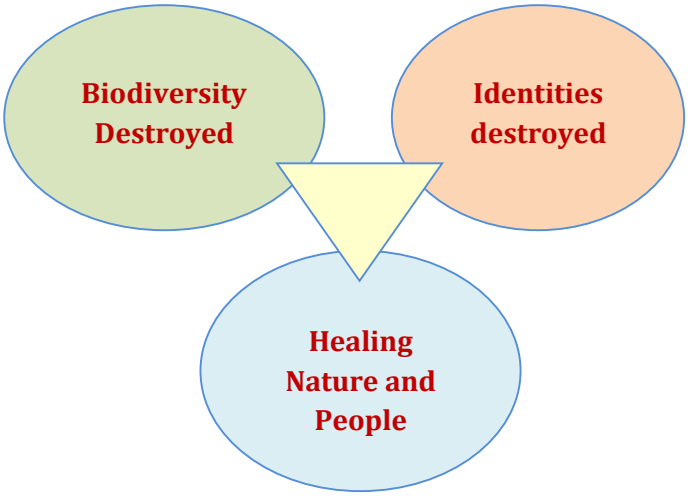
In order to change the dynamics of abc in a possible way, how do we shift the abc from a group of people meeting annually to discuss great and inspiring experiences about the work they are engaged in and as a council that steers with greater commitment and purpose? Do we know how much our farmers know about what we discuss here? Shall we turn our focus toward the community, which actually grows food at the ground to know how they adapt to the climate change?

We have discussed about the co-creation opportunities among members. One of the suggestions was to design small machines for processing small millets and value addition, experimentation on small millets production and consumption. Whoever has knowledge can share with others and bridge the gaps in skills and knowledge in the subject.

- An idea was mooted for abc India to meet once in six months to bring more dynamism as a network.
- Let us have an annual theme and pool our knowledge and resources, share and exchange through various ways and means.
- We need to streamline the annual subscription and share in concrete terms what we have been doing in relation to agricultural biodiversity community. We need to share our experiences, which need to be consolidated and made available for people to access it.
- We need to strengthen the portal/website with content and start using it. E-Newsletter is a platform available to facilitate knowledge sharing.
- We can initiate an online discussion forum moderated by someone, wherein we can raise our questions, and members can share their experiences and suggestions in response to the questions.

As a community, we are clear on knowledge areas related to agricultural biodiversity. The challenge is how we are going to work on strategies to bring it down to the levels of local communities. With the action at the ground, we can start exchanging our expertise, experiences, and suggestions as a community. The common thread apart from agricultural biodiversity that binds all of us is climate change, which we discussed in-depth. As a community, we have to take a position on the issue of climate resilience and start something around it. This will open up opportunities for partnerships with organisations and networks sharing similar positions.

Co-creation



In Thailand, second generation organic farming is a growing phenomenon. New and young generation farmers are taking up farming. There is co-creation opportunity on the theme of youths getting into farming. There is a need for different process of immersion and capacity building of youth on farming. The need was felt initially for one or two programmes, but there is a demand for at least five or six programmes under co-creation on the theme of 'Youth Back to Farming'. In this theme, there is scope for restoring the identities of the youth in farming and connecting them with the nature and biodiversity. It came as a way forward for further deliberation and detailing.

Knowledge Building Workshop on Farmer-led Agricultural Biodiversity Conservation for Climate Resilience

On the fourth day of the meet, a Knowledge Building Workshop was organised on the theme of Farmer-led agricultural biodiversity conservation for climate resilience. It was aimed at synthesising the learning from the field visits of the members on the first day and reflections of practitioners and community of farmers from different parts of southern India, who were invited for the workshop. Members of abc shared their observations and evolved leads for future practice.

Karthikeyan welcomed the participants from

- Wayanad Social Service Society (WSSS)
- M.S. Swaminathan Research Foundation (MSSRF)
- Farmers from Tamil Nadu
- Kani Tribals from Tamil Nadu
- Farmers from Karnataka (Magadi and Mysore)
- Members of Agricultural Biodiversity Community from nine countries

This workshop was a culmination of the field visit to biodiversity conservation and development initiatives in Wayanad followed by two days of intensive engagement in working groups' interaction.

- Climate change is a reality and the communities we are working with have been affected by this climate change in many ways.
- It is not that they are passive recipients; they are addressing it in various ways within their capacity as individuals and as a community. The members of abc are helping them in many ways by building their capacity.
- Though the climate resilience is a broader issue, members of abc are addressing the issues of agricultural biodiversity, which in turn enhances the climate resilience, and that needs to be strengthened by way of scaling up and mutually learning from each other.

In summary, these three statements have emerged from the last three days of deliberations. We started with understanding agricultural biodiversity in MSSRF, WSSS, Gurukula Botanical Sanctuary, Thanal and Cheruvayal Raman. We also had an exploration into the meaning of climate resilience and worked in three sub-groups on seeds and breeds, marketing and trade, communication and policy with respect to climate resilience and agricultural biodiversity.

Encountering new challenges such as climate change necessitates building knowledge, skills and institutional mechanisms necessary to address it. In the area of agricultural biodiversity and climate resilience, there is much to learn from each other, pool our knowledge, and build on each other to address the issues and challenges. This knowledge building workshop is a beginning. This will bring up the tacit knowledge of farmers for everyone's appreciation, learning and replication.

M.P. Vasimalai

abc is a stakeholders' collective, which includes practitioners, academicians, policy makers, and policy facilitators. All these stakeholders come and work together. abc tries to advance the practice of agricultural biodiversity in the context of climate resilience. Why did we choose Wayanad for this meet? Wayanad is a hotspot for three major issues such as biodiversity, climate change, and poverty habitation of many indigenous people. Western Ghats is a world heritage site notified by UNESCO. MSSRF says there were only 18 hotpots in 1982; now there are 34 hotspots of biodiversity, which shows the growing issue.

The field visit on the first day was quite enriching at all the five sites in sub-groups. The observations and synthesis of visit by the groups, and screening of short videos made on these three sites, were followed by deliberations by the representatives from each of the site. International experiences were also shared by the members. There will be takeaways for each of the participants from these experiences.

Frank Heckman, Embassy of the Earth, the Netherlands

I am glad to see indigenous people from Tamil Nadu at this workshop. Many years ago, I was talking to a famous ecologist Jon Liu, who ran a huge ecosystem restoration project in China and Uganda, where several hundreds and thousands of hectares of degraded lands were restored by bringing back canopy. I was telling him about the agricultural biodiversity community, which works with millions of smallholder farmers, who are telling us about the climate change. Because they are living on edges of culture and nature; and even before the international leaders finally agreed upon the existence of climate change last year, these farmers have already started facing the effects of climate change.

The scientific community is talking about the climate. People like you don't speak about climate, but you are speaking about the earth. The earth has been exploited heavily, we have reaped, reaped and reaped and never sown anything. Millions of hectares of lands have become degraded and that was one of the reasons for climate change.

I am from Holland, we have too much of water. Two-thirds of our country is beneath the sea level. We are known for our water expertise. They are not aware, some day it will become a delta like Bangladesh. But, Mother Nature and Mother Earth are much more humble than human.

If we look at the abc, NGOs who are working already with the smallholder farmers on biodiversity contribute towards climate resilience as well. People who are working with the Earth, cultivating lands, are in one way keeping the Earth balanced.

With deeper interaction during these days in the meeting, we understood the importance of climate resilience, which can enhance capacity of the farmers and fishermen to cope. Mitigation and adaptation to the climate change is going to be the way forward for our all of us. I am wishing all of you a very good and constructive day with this workshop.

Synthesis of learning from field visits

Bijo, WSSS

In WSSS, we are mainly focusing on organic farming by small =-scale farmers. We have gained deeper understanding on organic farming and its growing needs. We have 15,000 organic farms, and helped with certification for their produces. WSSS addresses the issues faced by farmers holistically. We have provided intensive training in organic farming of pepper and coffee. We are supporting them with credit support, procurement and supply of farm inputs. We have set up a processing factory, collect all the produces from farmers, process it, brand it and sell in outside market.

WSSS also provide other incentives such as health care, children's education, group insurance, agricultural implements, and bio-inputs to farmers. Second area of intervention is tribal welfare. Sickle cell anaemia was prevalent among tribal communities and made us to intervene in their health care. We have developed herbal medicine for sickle cell anaemia. We are implementing Wadi Project also with the support of NABARD; nearly 800 farmers are being supported. WSSS also provides training in Natural Resource Management (NRM) and organic farming to other institutions.

We have started our biodiversity conservation project in association with Foundation for Revitalisation of Local Health Traditions (FRLHT). We have created a medicinal plants conservation park in Boys Town Campus. Over 700 to 800 species of plants are conserved there. Also, we have documented ethnic knowledge of Vaidhyas. We are maintaining a register of all the medicinal plants in each Panchayat. Our focus is to revive ethnic medicines through ethnic communities.

We are now involved in pepper conservation project. We are documenting the traditional pepper varieties of pepper. Our experiences with improved varieties are not encouraging due to susceptibility to diseases and pests. Now, farmers are going back to traditional varieties such as Kudiraivali, that are resistant to changing climates. We are maintaining a nursery and undertaking germination studies.

Under NRM, we are conducting a watershed development programme. We are giving more importance to soil and water conservation. All these interventions are done through the peoples' organisations that are self-managed. Community Radio and Vikaspedia are other major initiatives started recently by WSSS.

A film made during the field visit by abc members was screened after the presentation of Biju, to provide glimpses of what they observed.

Observations

- Agro-processing initiative taken up to process coffee and market in distant markets, through export is a path-breaking initiative to be appreciated.
- Medicinal plants' Conservation Park is used as an educational tool to sensitise the youth about ethnic medicines and medicinal plants.
- Radio Mattoli (Community Radio Station) is operated and managed by the community themselves. It is an inspiring initiative to emulate.
- WSSS is focusing on conserving and promoting biodiversity, building up facility for value addition for the produces cultivated by the farmers.
- WSSS is touching needs of the farmers beyond farming, meeting their healthcare, children's education and other social development needs.
- There are challenges for replication and scaling up. As an institution, WSSS managed to source resources needed for reaching out and addressing needs of larger sections of the farmers. It is not so with other smaller organisations.

Suma, MSSRF

MSSRF works for conservation of agricultural bio diversity and livelihoods. Community Agro-Biodiversity Conservation Centre in Wayanad was started 20 years ago. Wayanad is culturally as well as biologically diverse. Wayanad is strategically located in Western Ghats with very unique climate and ecosystem. Also it is very vulnerable. Migration is a major issue, which started from prehistoric period itself and has led to conflict for resources.

MSSRF works on the 4C approach – Conserve, Cultivate, Consume and Commercialise. Human relationship with the biological resources starts with consumption. Only when we see any consumption value, we start conserving it. When humans started interacting with Nature for food, then we started cultivating some of them and when we had surplus we tend to share it with others, there starts commerce. That is why we focus on all 4Cs.

Sustainable livelihood encompasses overall empowerment of the communities to use traditional knowledge, biological resources to ensure their food basket, protect the biodiversity, and over and above this gaining some income. It is not just income alone.

Education, communication and training, our stakeholders are children, college students, government officials, panchayat presidents, and community leaders.

We started with documentation of traditional varieties and traditional knowledge associated with it. Then we validate the knowledge. *Ex situ on-farm* conservation is done in an exclusive land of 40 acres near Kalpetta. Now, it has emerged as MSS Botanical Garden, we are maintaining a rare collection of plant species and a sustainable model of farm with coffee-based farming system.

We are approaching the community with discussion on food and nutrition security. We cannot go and say you should conserve this many varieties. If we work on the diversity of their food basket, awareness on biodiversity would come naturally and we can start educating them about conservation.

There were traditional systems of conservation such as who will maintain seeds in a village. Socio-political changes eroded their system, which we want to rebuild. That is why we focus on empowering grassroots structures for agro-biodiversity management.

Our research and documentation strategy focuses on rare endangered plants, crop diversity, and wild relatives of crop plants. Then, we focus on *ex situ* on-farm conservation, and *in situ* on-farm conservation. We are conserving rare, endangered, and threatened (RET) species. We start with research and documentation of RET plants of Western Ghats, collect them and conserve in our botanic garden, establish nursery for propagation, then we distribute it to planters, schools, temples and other institutions.

We approach the communities to reintroduce some of the lost crops and protect the crops that are already in their cultivation and consumption. We have evolved a strategy for nutrition garden. We found there were 60 to 70 varieties of edible plants around their homes and later we found that there are cultural preferences for keeping and leaving certain crops. We have brought back the bamboo as food crop. Tribal communities have been accessing 372 wild edibles, 102 leafy greens, 19 Dioscorea, 40 wild mushrooms, 5 species of crabs, 39 fishes and 5 types of honey.

Ten rice seed villages conserve 12 rice varieties. Again, there are cultural preferences in maintaining rice varieties. We promote cultivation of seeds, exchange of seeds and marketing of traditional rice varieties.

Through women SHGs, we are involved in conservation of medicinal plants. There are 25 women SHGs involved in this activity; they have been trained in preparation of 36 herbal products. Also, we have been promoting home herbal garden of 35 species of plants with 575 households. The centre undertakes nursery for medicinal plant multiplication, exhibition and sales.

Under commercialisation, we have taken up good food campaign, interactive sessions on seasonal and native food diversity and organised Chandas for seasonal and native food items to popularise the use of traditional food basket items. We are involved in marketing of native food produces, rice vegetables, coffee, tea, etc. in local markets and linking farmers with consumers outside Wayanad. Ecoshop run by farmers group in Kalpetta sells these traditional plant products, supplies organic manures, fruits, rice, vegetables, honey, SHG products, etc. and provides information about seed materials.

Under community rights on biodiversity, we are helping Panchayats to maintain People Biodiversity Register, and helped grassroots institutions to register farmer's varieties. One of our groups has received Genome Saviour Award from the Government of India. With the cash prize of Rs. One million, we have invested it to

generate income, with which they have instituted a regional genome saviour award to honour local initiatives.

MSSRF organises Annual Seed exchange mela for three days; farmers from 27 Panchayats participate in it. There will also be participation from Seed Care, WTDC, and Biodiversity Board. In this festival, we sensitise Panchayats on biodiversity conservation and organise state-level seminars on agro-biodiversity conservation.

With over 20 years of experience in working on agricultural biodiversity with the community, we have realised that the issue of biodiversity is increasingly complex. In order to encourage farmers for on-farm conservation of bio-diversity, we have to incentivise the farmers who are safeguarding traditional varieties (the custodian farmers) and we are pushing for a favourable policy on it.

We are working with Panchayats to set up seed banks with a diverse collection of seeds to make it available to farmers.

On the other side, we are working on food and nutritional security of households, which are primarily dependent on agricultural biodiversity. We are promoting location-specific nutritional garden suitable for different cultural groups. We are also focusing on children. 'Every child is scientist' programme instils the sense of ecological consciousness among the children.

Observations

- Conserving landraces is very impressive, but it is not enough. In the middle of growing threat of climate change, one landrace in one community, in one area is not enough to cope up with the risks of extinction. We need to work on genetic bio-diversity. For example, genetic diversity of rice varieties in India, China, Iran and Africa - all are important. We have to work on research with this perspective.
- It was a complete exposure to the biodiversity that humans need and use different kinds of food. More than what the human needs, there is beauty and grace in nature and there are plants, flowers and herbs, for many of them, we do not know the use. However, we are intending to protect them. There are custodians of such plants, flowers, fruit trees and so on, making wonderful contribution to Nature.

Gurukula Botanical Sanctuary (GBS)

The Botanical Sanctuary consists of 3500 plant species. There are about 150 varieties of epiphytes which are contributing to production of one-third of water for river streams. Plants are dependent on micro climate system and are also capable of creating their own micro climate system. Plants always contribute to existence of other plants and animals. In this sanctuary, one could notice plants growing on top of another and serving as base for another. Different plants have different reproducing mechanisms. Plants produce both viable and non-viable seeds. Non-viable seeds turn viable when there is a need. Whenever we uproot invasive plants, we should replace it with native plants. Land should not be left open or bulldozed. 40 years of experimentation and learning from bad experiences helped in rescuing rare small plants from extinction. The staff in this sanctuary mimic rainforest environment through composting twigs in mud pots.

This sanctuary serves as a library because there is something for everyone to learn. Some of the salient features of the sanctuary are as follows.

- Cactus which survive in high rainfall area
- Plants which are to be pollinated artificially
- Plants which prefer fibre mats to soil
- Plants which are having origin from different continents
- Carnivorous plants such as pitcher plant
- Plants that produce their own clone.

She concluded by saying 'Plants are saving planet; whatever action humans contribute to save plants, is a great contribution to the planet'.

Observations

- How deep is the impact on children when they are exposed to the GBS? Education is the soul of the sanctuary, which is offered to everyone without any discrimination.
- A special note written by Frank Heckman is provided in the *annexure* for reading.

Dhakshinamurthy, Kani Tribal, Tamil Nadu

Dhakshinamurthy represents 20000 Kani tribals in Ambasamudram area of Tamil Nadu. They are cultivating lemon, citrus, and pepper crops. Earlier, they had cultivated millets; now, it is almost eroded. They lost their seeds due to recurrent droughts that made them abandon cultivation of small millets. They are now working towards reviving such millet cultivation. Also, they have a rich collection of herbs in their forests, which they are using for treating many of the diseases that are incurable by allopathic medicines. Today, the Kani tribes are organised and want to restore and protect their biodiversity.

Earlier, they used to receive regular rainfall, with which they cultivated different varieties of crops. Now, there is a drastic change in the rainfall pattern that affected it. Even then, they are not going for chemical fertilisers and pesticides for their crops.

Ganesamoorthy, Secretary of Kani Tribal Cooperative

They have six traditional healers, who are very popular. Their food system has changed. Shifting cultivation on the hill tops was very amenable for small millets, which they lost after forest regulations. Due to notifications they moved to lower elevations. They resorted to rice-based food system. Lifestyle diseases have started emerging after change in their food system. The housing pattern also changed

imitating urban housing, using asbestos. Also, they shifted to cultivation of commercial crops such as pepper and rubber.

Ramachandraiah - Magadi, Rame Gowda - Periyapatna, Karnataka, India

Magadi is located near Bangalore, which is a fast growing metropolitan city in India. Naturally, it has influence on Magadi as well. Migration and urbanisation are the major phenomenon in this area. Earlier, they cultivated traditional varieties of vegetables and millets such as ragi (finger millet) and Samai (little millet). Now, their food system has shifted towards rice. After realising ill effects of using chemical fertilisers for many years on lands and crops, and health, now they are resorting to organic cultivation and mixed cropping of vegetable crops, which shows promise. Interestingly after resorting to organic farming, they are able to spot birds and butterflies in their fields, which signify the importance of natural farming methods to biodiversity. Earlier, they produced for their self-consumption alone, with increased family size, they had to resort to modern methods and crops that were detrimental.

Main crops cultivated by the farmers in the Periyapatna area of Mysore region are tobacco, Ragi, Bajra and paddy. Tobacco cultivation involves usage of a large amount of chemical fertilisers. Now, they are going for Ragi and Paddy. Also, they are maintaining dairy as an alternative or subsidiary activity.

Leenesh, Thanal, Wayanad, Kerala

Thanal is an organisation which works on agriculture biodiversity and sustainable resources management. They are involved in conservation and promotion of traditional paddy, tubers and vegetable varieties. They have a centre in Wayanad and an organic outlet in Thiruvananthapuram. They have conserved 219 varieties of paddy in which about 150 varieties are indigenous varieties. They are conserving these varieties by promotion of paddy biodiversity centre. They are not using System of Rice Intensification (SRI method, they follow single seedling method.

Cheruvayal Raman: Custodian of Traditional Paddy Varieties

Raman belongs to ‘Kurucha’, a scheduled tribe community of Wayanad. Major livelihood of this community is traditional farming and cattle rearing. Their ancestors hunted animals for food and collected forest produces for livelihood. Due to Forest Protection Act, the government did not permit them to access forests. Their ancestors never consumed domesticated animals except chicken. They used to consume fishes, wild animals, birds, and tubers.

Wayanad is rich in fertile soil and climate that is suitable for agriculture. These tribes cleared forests, converted it into agriculture land and cultivated it as joint family. A joint family consists of ten to sixty members. Raman started farming from the age of 10 years. He has seen 160 varieties of paddy, 6 varieties of finger millet, 3 varieties of Sorghum, 6 varieties of little millets and 4 varieties of fox tail millet.

He loves to lead a natural and traditional way of life. Though he secured government job and government allotted a house, he refused it. He never used pesticides and insecticides in his farms. Seeds sown by him are 500 years old. He believes that hybrid varieties will last long for certain period only and it is not good for health. Hybrid varieties need higher inputs of chemicals which will pollute environment. He used to interact with school and college community about importance of traditional farming system. Though his family is against the traditional farming system, he is reluctant to change.

He strongly believes that humans have no authority to do breeding artificially. The Central Government has appreciated him by presenting 'Plant Genome Saviour Award' 2016 for conserving 50 rare traditional paddy varieties.

International Experience

M.P. Vasimalai

This knowledge building workshop has a special significance, wherein we have both national and international organisations coming together to share their experiences in agricultural biodiversity with reference to climate resilience. They would share what kind of knowledge has already been generated and what kind of knowledge they are intending to generate through experimentation.

Jeff, Kenya

PELUM Kenya is working with member organisations who are involved in promoting agricultural practices that in turn promote agricultural biodiversity. Some are involved in organic agriculture, some are involved in ecological agriculture, bio-intensive farming systems and some are promoting cattle farming. All are contributing to agricultural biodiversity and we have different models. We can document those models and make them available to abc members.

In Kenya, we have a diverse indigenous foods and seeds for such food crops. All these are locally available and affordable. These food crops are very hardy and able to withstand and survive climate change. People also consume these foods consistently. ABC members would consider working on these traditional foods, which are the base for agricultural biodiversity. In contrast, the modern varieties of food crops require high resource intensive inputs such as seeds and fertilisers.

We are also promoting seed mapping. In PELUM Kenya, we work with Kenya Agro-biodiversity Coalition, which is focused on seed mapping. We have a strong seed savers network and we can start working on seed banks as an addition to these networks.

Maedy, Iran

In CENESTA, Iran, we are working on evolutionary plant breeding to bring back varieties to the farmers' fields and thereby increasing farmers' access to biodiversity and genetic diversity. Traditionally, with the indigenous knowledge, our farmers have been coping-up with different kinds of climate risks such as droughts, floods and cold. We have documented experiences of farmers, who have been facing such challenges and their best practices in managing them in video format, which we would share it across the abc. Evolutionary plant breeding is a live seed bank in farmers' field.

We have been promoting evolutionary plant breeding for more than a decade, and now the farmers have seen very good results and the methodology proved its efficacy to enhance agricultural biodiversity and mitigate climate change in the future. We would make this knowledge of evolutionary plant breeding available to everyone for replication. We see this as an excellent tool for securing agricultural biodiversity and food for the future. CENESTA in association with the abc would organise training workshops in evolutionary plant breeding, which would help participating organisations to replicate the practice of this methodology in their countries. Other than this training workshop, members can visit CENESTA anytime to learn about it.

Most part of Iran is dry, the summer is usually very warm and the winter is very cold. There is acute shortage of water. In one of the communities with whom we are working, livestock is a major source of their livelihoods. Even with the meagre rainfall they receive, they used to maintain almost 35 varieties of crops, two varieties of goats and two varieties of sheep. Each family would maintain a particular variety of fruit tree or vegetable that the other families would not grow. We found that these communities would exchange their produces to fulfil the food and nutrition requirements of all the families with the varieties of all types of foods, which they grow with the meagre rainfall. We found this is an excellent local innovation to fulfil their needs through mutuality.

In another area, where we are working, the local communities maintain livestock for many decades, where the drought is a recurring phenomenon. Even with the drought situation, they maintain local varieties of crops they evolved through evolutionary plant breeding that are capable of withstanding drought situation. In many ways, the local communities have evolved many innovations that are suitable to their local situation and mostly they are found to be sustainable solutions.

Thomas, Zimbabwe

Farmers in Zimbabwe have been facing these issues historically since colonialism. When they introduced new crops, technologies and cropping system, our farmers lost their connectivity with the environment, crops and food systems. They had lost their institutional memories; we are now re-introducing crops and training people on traditional recipes. Perception of the youth towards such traditional food has been very negative and there is a changing perception of taste. With the same crop produce, they want a variety of food in different tastes unlike Southern Africa, where the food made of such crops are monotonous and people are fed up with those foods. There is a growing need for diet diversity. Also, many of the farmers have shifted their cropping to commercial cultivation of tobacco and cotton. We have a twin challenge of addressing both production and consumption related issues, which we are addressing through our organisation.

We are using farmer's field schools as points of learning, knowledge generation for farmers on agro biodiversity. We also have a mission of conserving plant germplasm of traditional crop varieties. Also, we are promoting seed banks to store this germplasm. We have so far promoted 50 such seed banks, one in 3-4 villages. We involve farmers in every step of promoting seed bank, making it more participatory. We have to work with the National Gene Bank to intensify our efforts of protecting germplasm. Our farm field schools provide an opportunity to adopt participatory plant breeding.

Also, we are in the process of profiling traditional crops in terms of their nutrition composition. With the help of Food Science Departments of local universities, we are profiling nutritional content of the foods. In our part of the country, people also consume insects such as termites, grasshoppers, ants and crickets, which are important source of proteins. We are also promoting millets and sorghum, but

the challenge is preparation of varieties of foods. We collaborate with the members of abc in Kenya to help us generate recipes of new dishes made out of the traditional crops. Also with respect to vegetables, we have many traditional varieties, which we have to promote through eco-green-shops.

The challenge continues to be taking the message of value of traditional foods among young generation and make these foods available in supermarkets.

Anne Maina, Kenya

When we start working on the issues of climate change and building resilience among the farming community, we need to count multiple factors that decide on their preparedness.

In the area of one our members, the men have completely covered the lands with tea plantations without leaving space for women to grow vegetables required for their family needs. Because the men get many incentives and bonus from companies buying their produce, which they use to spend lavishly, the women are left voiceless and denied of their space for growing vegetables. This type of change is undesirable and culturally inappropriate. There is a clear gender divide in terms of crops owned by women and crops owned by men. On the other side, men take the responsibility of digging forests to collect tuber crops to feed their families. We need to understand the cultural aspects of the food in order to ensure food and nutrition security.

The other major issue is the market. When the women produce their local crops in excess, they would like to supply it to the supermarkets in the cities. These markets mostly dictate the prices and the quality specifications of the crop such as size, shape and colour of the food. Understanding this constraint, we have to connect these women with the markets, which continue to be a major challenge.

Another big challenge is how we are going to bring the young people on board. We need to expose these city bred and urban youth to the rural realities to experience the life in a village, to make them understand the local foods, how they are produced and the cultural value of such foods.

Concluding Session

Edith van Walsum

We are living in the Earth that is hurt by mankind. By hurting the Earth, it hurts itself. We have a lot of solutions. We do not have a total solution for such a big and complex issue. There has been an enormous degradation of the Earth and people have been affected by it. We have beautiful and practical solutions before us; we have seen the beautiful picture of Gurukula Botanical Sanctuary. Also, we have seen a beautiful picture of all kinds of rice varieties in a mosaic of colours, green, yellow, brown and so on. Beauty in the sense; I mean not just the colours alone, but the functional and practical, a symbol of diversity and colourfulness.

Let us think about engaging citizens. Citizens, I mean the farmers, who produce the food and the people who enjoy the food produced by the farmers, the consumers. The citizens are co-producers, who can help farmers produce better food, organic rice, spices and vegetables.

Another step ahead is connecting the food and culture, which we have been discussing a lot here. In urban restaurants, the chefs are really starved for new variety of dishes, which our traditional crops can make a perfect fit in their menu with a little innovation in preparation. It will make people think about the traditional food system, how rich and diverse it was. These chefs are to be brought on board in furthering the Movement of Diversity.

Also, we have to support our farmers to find new markets for their produces. In the Netherlands, we have coined a new word – New Farmers, who are young and new generation farmers, with or without farming background. There is a new sign of such new farmers, the youths look around and take farming as their way of life. Even if they knew it won't make them rich, won't bring luxurious cars, but they have made up their mind to spend their money in the new lifestyle they chose for themselves. It is easier said than done. There are people running away from rural areas at the same time there are people coming towards rural areas with the new mindset.

I would like to end with the word 'Passion'. This passion will make the change. The logical reasoning of how things are going on, and how things will be moving in the future, will turn things cheerful and with the passion we can bring this change amidst hardships and challenges.

Ana Galvis

My call to all the movements, which are working for social and environmental justice, is to humanise the whole effort to make it centered on humanity. The second thing I would like to propose is to feminise the movement. The whole world is imbalanced. Female energy is not rightfully honoured. They are seen as tender, kind and weak and oppressed by the masculinity, power and money. Therefore, we need to feminise the whole movement. Another proposition is bringing balance in everything. Between reasoning and the artistic and cultural pursuits, we should strike a balance between art and science. Finally, we have work hard to build alliances to grow movements like abc.

Supraba Seshan

I am impressed with this effort of bringing together people working on agro-biodiversity. I am associated with the group, who worship plants around. These are the plants that are not necessarily edible, medicinal and useful although some of them are. But something I realised having worked for over 25 years, here is the power of plants. These plants have come through hardships, disturbances, high pressures and somehow these plants are sign of hope for me. If I see myself as a drop in an ocean,

I will see myself powerless, if I am a drop in a desert, one can see how powerful and precious it is. Our work is with the endangered plants that we consider as plant refugees. If we give a little protection, what an amazing thing those plants would do. Plants are not just the basis of human life, but they are the basis of all the planetary life. If you give a little chance, the plants will just cover the planet, bring coolness and beauty. That is what the power of a droplet in a desert is.

Krishna Prasad

ABC can take up the work of identifying, mapping and revival of the seed diversity. Seed is life. We should see the value in it. We need to promote free exchange of seeds. There should not be a boundary and quarantine. It is all the wealth of the mankind. This is what the abc community should be doing to make seed exchange the right of the farmers across the borders.

Revival of Seed Diversity and Knowledge: We should not be solely dependent on new varieties released by the universities. We should promote local varieties developed by the farmers. When we started 'save rice campaign' in Karnataka, the demand from people was for high yielding varieties, but we focused on a few local and traditional varieties. What is sacred about IR-64? No pooja, no sacred value it enjoys! Whereas when we find the traditional variety Ratnachoory, people will just rejoice about its texture, taste and aroma. The hybrid rice has no takers in organic outlets in Bangalore. If we keep traditional rice in the shelves, within no time it is sold out. My humble request to abc is to follow any method, may it be participatory plant breeding, evolutionary plant breeding and so on, just focus on traditional varieties.

Value Addition and Building Markets: The second thing is that we have the strength of value addition. We have learnt it from the abc members in Thailand on how to do value addition and how to do marketing. Look at the farmers in Periyapatna in Karnataka, all the farmers in the villages grow tobacco, what is the fun in it? They all take loans from banks, insure and grow and give it to traders, simply work like machines. At the same time, when you go to Kandhamal area in Odisha, each farm has 20–25 varieties of crops, one is harvesting foxtail millet and another is harvesting vegetable and everywhere they are full of crops with multiple colours. Farming should bring happiness along with wealth to the farmers. We must give importance to the value addition.

Green Media: Finally, we must share our stories loudly outside along with experiences of people like Leenesh (Thanal) and Rajesh (city-bred youth involved in organic farming in Wayanad). These youths stand as inspiration for others. We must document their stories and share with the youths in the urban areas, who can get into such noble work sometime now or later.

M.P. Vasimalai

It is a different meeting with a different experience. We had the diversity of agriculture, fishery, and forestry. Somehow, we could not bring members working on livestock. We must ensure such diversity of members in the forthcoming interactions. We should observe the value of self-regulation and start operating on the commonly agreed areas independently and voluntarily.

Fr. Bijo, WSSS, Wayanad, Kerala

It is just a beginning. We are now a family, which includes our plants, creatures, soil and other organisms in this Earth. God has created this for the betterment of the humanity, let us protect it as such and pass on to the future generations. It is an opportunity for WSSS to host this meet and let us continue our journey of protecting agricultural biodiversity in all spheres. Thanks to everyone, who made it possible.

With his vote of thanks, the 6th ABC meet came to an end.

Accounting for Natural Capital

Prakash Nelliyat

The Hindu, 9 December 2016 00:10 IST

AN UMBRELLA: “Many ecosystem or biodiversity goods and services act as a safety net to indigenous peoples, poor and vulnerable groups, women and children.” Picture shows a part of Soova, near Araku in Andhra Pradesh. — PHOTO: K.R. Deepak | Photo Credit: K.R. DEEPAK

Biodiversity integration into developmental plans is crucial for sustainable development

In a ‘Mann Ki Baat’ broadcast recently, Prime Minister Narendra Modi made his environmental concerns clear when he asked people to use Ganesha and Durga idols made of clay instead of plaster of Paris. His appeal is bound to stimulate our environmental consciousness and encourage the preservation of precious natural resources. We need to build on this appeal and follow an eco-friendly approach in every socio-economic activity of ours.

Biodiversity is a unique and a critical asset which is under pressure due to anthropogenic reasons, and there is a need for its mainstreaming. Biodiversity once lost is lost forever.

Biodiversity means the variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems. The diversity includes variability within species (genetic diversity) as well as between species (species diversity) and ecosystems (ecosystem diversity). It provides services such as water purification and supply, waste assimilation and the cleaning of air and water, regulation of pests and diseases, and soil nutrient cycling and fertility. Biodiversity helps mitigate unpredictable global changes and natural disasters. A rich biodiversity is the basis for good health, food security, economic growth, livelihood security and moderation of climatic conditions. The annual contribution of biodiversity to the world is put at $33 trillion.

Many ecosystem or biodiversity goods and services act as a safety net to indigenous peoples, poor and vulnerable groups, women and children. More than 70 per cent of the world's poor live in rural areas and are directly dependent on the ecosystem/biodiversity goods and services for their survival.

The Indian scenario

India, one of the 17 mega-diverse countries, is rich in biodiversity and its associated traditional knowledge systems which have been gathered from times immemorial. Due to its sheer size, range of topography, altitude and climate, India exhibits a rich variety of ecosystems such as forests, grasslands, deserts, wetlands, mangroves and coral reefs. These provide basic needs such as food, fibre, medicine, fodder, fuel wood and timber. Around 1.2 billion people coexist with 8 per cent of recorded species, which includes over 45,000 species of plants and 91,000 species of animals. India's tribal population is also dependent on forests and natural resources to a significant extent.

Mainstreaming biodiversity

India possesses around 18 per cent of the world's population, but only 2.4 per cent of land and 4.2 per cent of water resources. To achieve a high GDP growth rate, rapid development that pertains to industry and infrastructure is required. But our developmental activities are greatly affecting biodiversity. Natural resources such as water, forests, fisheries and marine resources are being overexploited, which in turn affects their renewability. A recent study shows that India will become water scarce by 2025. Emissions from industry and the transport sectors are at a high level. There is also indiscriminate discharge of solid wastes, industrial effluents and domestic sewage with considerable impact. Therefore, proactive efforts in ecosystem management that involve government and community are needed.

Economic sectors such as agriculture, fisheries, forestry, health, nutrition, water supply, energy, trade, industry, transport and tourism depend on biodiversity and impact biodiversity.

Biodiversity conservation has traditionally been the responsibility of the environment sector, and undertaken through measures such as the enforcement of legal decisions, 'polluters pay principles' as well as the incorporation of protected areas. As the developmental sector generally ignores its responsibility towards biodiversity conservation, a more responsible approach towards biodiversity management, by mainstreaming, is needed.

Mainstreaming or inclusion means integrating/including actions related to conservation and promoting the sustainable use of biodiversity in strategies relating to production sectors such as agriculture, fisheries, forestry, tourism, and mining. It also refers to including biodiversity considerations in poverty reduction and national sustainable development plans. Mainstreaming helps to reduce the negative impacts on biodiversity. For example, in agriculture, strategies to minimise the use of and optimise the application of chemical fertilizers and pesticides reduce negative impacts on soil, groundwater, surrounding habitats and wildlife.

Small-scale farming or aquaculture activities undertaken in a sustainable manner might prove to be a relief to wild species. Positive biodiversity impacts might also be optimised through promoting people's access to benefits derived from the use of biological resources. Community-based joint forest management, promotion of traditional multi-species and multi-variety agricultural practices, securing access to medicinal resources for local use, strengthening traditional and cultural practices, and governing the use of wild resources are examples.

Further, the fair and equitable sharing of the benefits arising out of the use of biological resources and the knowledge associated thereto (one of the objectives of the Convention of Biological diversity, or CBD, and the Biological Diversity Act of India) by users (industries) to the providers (communities) act as incentives to local communities in the conservation and sustainable use of bio-resources.

What is needed

It is clear that to achieve many national and international biodiversity goals such as the National Biodiversity Strategies and Action Plans and the Aichi Biodiversity Targets, as well as meet CBD objectives, biodiversity integration into developmental sectors is a prerequisite. After understanding its relationship with biodiversity, each sector should come up with appropriate mechanisms for conservation and sustainable biodiversity use.

The active involvement of Central/State Ministries and Departments is needed. Further, research institutions need to chip in and come up with appropriate management strategies, with budget options. Public and private entrepreneurs and entities as well as the public need to come forward to mainstream biodiversity. (The statistical references mentioned in this article are from various published reports.)

Dr. Prakash Nelliyat works with the National Biodiversity Authority, Chennai. The views expressed are personal. E-mail: nelliyatp@yahoo.co.uk

Source: The Hindu, Dated December 09, 2016

http://www.thehindu.com/opinion/op-ed/Accounting-for-natural-capital/article16779362.ece

Sri Lanka and its Biodiversity how community can benefit and contribute

Dr. Sunil Liyaange[1]

1. Physical Features

Sri Lanka is located at the southern point of the Indian sub-continent between 5° 54' and 9° 52' North Latitude and 79° 39' and 81° 53' East Longitude. Its land area measures 6,570,134 ha. Topographically, the island consists of a south central mountainous region which rises to an elevation of 2500 m, surrounded by broad lowland plains at an elevation of 0-75 m above sea level. From the mountainous region, nine major rivers and 94 other rivers drain across the lowlands into the Indian Ocean. The climate is tropical overall, but it shows variations across the island mainly due to differences in rainfall and elevation. The rainfall shows seasonal fluctuations and is dependent on the southwest and northeast monsoons and on convectional and cyclonic effects. The mean temperature in the lowland areas is 27°C in the wet region and 30° C in the dry zone. It decreases with increase in altitude, and in the montane region, the mean monthly temperature varies from 13°C to 16°C, with the night temperature occasionally dropping to around zero. Generally, three broad climatic regions are recognised: ***the wet zone, dry zone*** and ***intermediate zone***.

2. Conservation of Biodiversity in Ancient Lanka

Sri Lanka has a long history of protection of wildlife and sustainable use of forests, fostered by Buddhist philosophy that respects all forms of life. One of the world's earliest wildlife sanctuaries was established by King Devanampiyatissa in 246 BC, along with the advent of Buddhism to Sri Lanka. Succeeding kings upheld these traditions, and kele koralas (forest officers) were appointed to prevent poaching and to protect trees belonging to the Crown. In the twelfth century AD, King Keerthi Nissanka Malla proclaimed that no animal should be killed within a radius of seven 'Gau' (equivalent to 35.7 km) of the sacred city of Anuradhapura.

Commenting on this aspect of social life, John D' Oyly (1835) states that "Within Mahanuwara itself there was no doubt that the forest was strictly interdicted as a royal preserve – the ditch marking the limits of the city went round the king's great thicket, Udawattekale, and people were not allowed even to gather firewood and withes in it." The king ensured that these laws were enforced by a regular Forest Department, comprising the "Kale Korales" appointed by him. It was the duty of these officers to ensure that the Crown forests were not damaged in any way. In keeping with the prevalent social fabric, hunting and killing of animals appears to have been generally looked down upon, for the ''Niti Nighanduva" states that animal slaughter was outlawed during the last 50 years of the Kandyan Kingdom, on the grounds that it was contrary to Buddhist principles. Respect for forests and all forms of animal life was thus not only deeply enshrined in the moral and legal codes of the ancient Sinhalese,

[1] CEO/Director- CB Lanka Micro Credit, Former Deputy Conservator – Forest Department
Former – Director(Technical) - Department of Wildlife Conservation

it was also a part of their way of life. When the British began clearing the forests in the mid-19th century, it destroyed an ancient society and a way of life which had existed since the coming of Buddhism to Sri Lanka in the third century B.C.

3. Biological Diversity

The Global Biodiversity Strategy and the Convention on Biological Diversity recognise three functionally related components of biological diversity, or biodiversity:

Genetic diversity within species

Genes are the storehouses of the heritable characteristics of an organism, and form the basis for variation between individuals of a species. The qualitative and quantitative variation of the genetic material between individuals, and the genetic variation between populations of the same species, constitutes the genetic diversity of a species.

Species diversity

This is the component of biodiversity that is most widely known and often used as a synonym of biodiversity. Species are populations of individuals within which breeding could take place to produce fertile offspring. Species diversity refers to variation between species, or to the variety of life forms on earth. To date, about 1.7 million species have been described, and it is estimated that the total number of species present on earth may be many times this number. The measurement of species diversity provides an important preliminary assessment of overall biodiversity.

Ecosystem diversity

This refers to the variation between ecosystems. Different species of animals, plants and microorganisms interact to form communities. In concert with the processes that maintain their lives, and interacting with their non-living environment, these communities form functional, dynamic and complex units that are termed ecosystems. Different permutations of species and their interrelations, combined with differences in abiotic factors such as climate, soil and water, give rise to different ecosystems.

Conservation of biological diversity covers all human actions ranging from totally preserving any component of biological diversity to using biological resources within sustainable limits so that there is no erosion of biodiversity (Main source: WCMC, 1992).

4. Ecosystem Diversity of Sri Lanka

Forest and related ecosystems

- **Tropical wet evergreen forest (lowland rain forest)**
    - Tropical moist evergreen forest
    - Tropical dry mixed evergreen forest
    - Tropical thorn forest - Savannah

- Riverine forest
- Tropical sub-montane forest
- Tropical montane forest
- Dry montane grasslands dry patanas

- **Inland wetland ecosystems**
  - Flood plains
  - Swamps
  - Streams and rivers
  - Reservoirs and ponds
  - Wet Villu grasslands
  - Wet montane grasslands wet patanas
- **Coastal and marine ecosystems**
  - Mangroves
  - Salt marshes
  - Sand dunes and beaches
  - Mudflats
  - Seagrass beds
  - Lagoons and estuaries
  - Coral reefs
  - Coastal seas
- **Agricultural ecosystems**
  - Paddy lands
  - Horticultural farms
  - Small crop holdings or other field crops (pulses, sesame, etc.)
  - Crop plantations
  - Home gardens
  - Chena lands (slash and burn cultivation)

5. Importance of Biodiversity Conservation

Sri Lanka's high population density, high levels of poverty and unemployment, and widespread dependence on subsistence agriculture have exerted considerable pressure on the biodiversity of the country. Extensive deforestation and land degradation and the unregulated exploitation of natural resources (e.g. mining for coral lime, sand and gemstones) are some of the manifestations of the social problems the country faces causing destruction of natural ecosystems and the species they contain. The conservation of biological diversity is of special significance to Sri Lanka in the context of its predominantly agriculture-based economy and the high dependence on many plant species for food, medicines and domestic products.

Over a third of the plant species in the country are used in indigenous medical practice, and many of these species are becoming scarce due to habitat destruction and over-collection. The rich and diverse ecosystems of the country contain many wild relatives of cultivated species, and the gene pools represented by these wild plants are a resource of considerable potential value that could be used for genetic improvement of cultivated plants. Another valuable genetic resource is the wide range of

varieties and ecotypes of cultivated species found in the country. For example, in the case of rice, there are over 2500 accessions of indigenous varieties. These have not been fully characterized, and allowing for the presence of duplicates it would appear that these accessions represent about 1000 distinct cultivars. Plant products such as fruits, fibre, spices, kitul sap, bamboo and rattan are used as raw material for many small-scale industries which provide financial security to rural populations. The biological resources of coastal and marine ecosystems provide nearly 70% of the protein requirements of the country and generate employment for about 500,000 people.

Biodiversity also contributes directly to the national economy in the form of revenue from national parks and other wildlife reserves, while its potential to promote eco-tourism could be a significant income generator in the future. The forests of southwest Sri Lanka (wet evergreen forests) are particularly rich in biodiversity and endemic species, and they are fragmented and under severe threat. On account of this, southwest Sri Lanka has been named as one of the 18 biodiversity hotspots in the world (i.e. an area with high species diversity and high levels of endemism and where species are subject to exceptional levels of threat). Conservation of Sri Lanka's biodiversity, therefore, transcends national interests; it is of global relevance.

6. National Conservation Review

The National Conservation Review (NCR) of Sri Lanka was carried out by the Forest Department with technical assistance from IUCN. This unique exercise constituted a systematic assessment of biodiversity in the natural forests of the country. Its overriding objective was to define a national system of protected areas in which watersheds important for soil conservation and hydrology are protected and forest biodiversity is fully represented, while meeting the cultural, economic and social needs of the country. The review covered all natural forests in the country of 200 ha or more, except those in sections of the north and east which were inaccessible due to political unrest. Between April 1991 and September 1996, 204 forests were subject to biodiversity assessment by sampling 1,725 plots of 100 × 5 m along 310 gradient directed transects (gradsects).

An important feature of the methodology used is that gradsect sampling optimises the sampling of species in relation to time and effort. Although the biodiversity assessment was restricted to woody plants, vertebrates, molluscs and butterflies, the NCR is hailed as one of the most detailed, comprehensive and innovative evaluations of its kind carried out on a country-wide scale to date. The study has yielded 69,400 records of 1,153 woody plant species and 24,000 records of 410 faunal species. A total of 281 forests were also evaluated for their importance in soil and water conservation. The NCR reveals that although Sri Lanka has an extensive protected area network covering almost 14% of its land area, critical gaps exist in the context of biodiversity and hydrology conservation. T

The present protected area network does not adequately represent some floristic regions of the country, including areas that occur within the biodiversity rich wet zone. In addition, about 15% of indigenous terrestrial species diversity is not found within the established protected areas. The NCR identifies the wet zone forests as the most important in terms of soil and water conservation. As regards biodiversity, the survey has revealed that 79% of the woody plant diversity, 88% of endemic woody plant diversity, 83% of faunal diversity, and 85% of endemic faunal diversity are represented

in just eight units of contiguous forests. The comprehensive picture of natural terrestrial biodiversity that has emerged through the NCR will provide valuable information for planning an optimal network of protected areas (Green and Jayasuriya 1996; Green 1997).

7. Protected Area Network in situ Conservation

Sri Lanka has a wider range of protected area network managed by Department of Forest Conservation and Department of Wildlife Conservation. Based on findings of NCR and other researches and studies, protected area network expansion and details of protected areas are given below.

Forest Department

- ***World/National heritage wilderness areas – 02***
- ***Conservation Forests - 55***
- Forest reserves – 360
- Other state forests-N/A
- International Biosphere Reserves (MAB) - 04
- National Biosphere Reserves – 31

Department of Wildlife Conservation

- *Strict Nature Reserves (SNR) -03*
- *National Parks (NP) - 21*
- *Nature reserves – 05*
- *Jungle corridors - 01*
- *Sanctuaries - 63*
- *Buffer zone - 00*
- *Marine Reserves – 02*

8. Agricultural Biodiversity

Sri Lanka has been an agrarian-based society for more than 2500 years. At present, agriculture contributes 20% to the country's GNP, second only to the manufacturing sector. The agricultural landscape of the country consists mainly of rice, covering 780,000 ha of cultivated land, and the plantation sector amounting to about 772,000 ha. The plantation crops are tea, rubber, coconut and sugarcane, and on a smaller scale, coffee, cocoa, cinnamon, pepper, clove and other spices. Other crops in this sector include over 100 species used as items of food. Many of these such as onion, potato and vegetables, remain a small farmer activity, and most fruit species are grown in home gardens. A few crops such as chilli and cashew are grown on a semi-commercial scale. A good many field crops also continue to be harvested from chena plots in the dry zone. Home gardens also make a substantial contribution to agricultural production, and it is estimated that there are now a total of around 1.33 million home gardens in Sri Lanka, accounting for about 367,800 ha of cultivated land.

Sri Lanka's farming systems which have evolved over thousands of years include a rich array of cultivated plants including grains, vegetables, fruits and spices, and livestock. Adding to this, numerous new local cultivars have been developed in the plantation sector during this century. In terms of crop biodiversity, the long history of rice cultivation and the wide range of eco-edaphic conditions present in the country have resulted in Sri Lanka having a wide varietal diversity of *Oryza sativa*. Indigenous rice varieties show adaptability to various adverse climatic conditions. Sri Lanka also has considerable biodiversity in terms of other cereals such as millet, sorghum and maize. Unlike rice, most other cereals have undergone little selection by farmers. Grain legumes such as cow pea, green gram, black gram, winged bean, and soya bean constitute an important source of protein for most Sri Lankans, particularly in rural areas, and are increasingly used for crop diversification.

Sri Lanka has been world-renowned for its spices for centuries. There are at least eight indigenous species of *Cinnamomum*, of which the wild species are restricted to the natural forests of the wet zone. Another important local spice crop is *Elettaria cardamomum*. The spice plant *Piper nigrum* (pepper) and the betel leaf plant *Piper betle* are both widely cultivated in the lowland wet and intermediate zones of Sri Lanka. *Syzygium aromaticum* (clove) is cultivated in home gardens of the Kandyan and Matale districts, and *Areca catechu* (arecanut or betelnut) is a common home garden species in the wet zone. A wild relative of arecanut, *A. concinna*, is considered endangered in the wild. Among other spice crops found in Sri Lanka are three species of nutmeg (*Myristica*), two species of chilli, (*Capsicum annum* and *C. frutescens*) and one species each of ginger (*Zingiber officinale*) and turmeric (*Curcuma longa*). Among the horticultural crops grown in Sri Lanka, there are several cultivars of banana (*Musa* spp.) cultivated in the different agro-ecological regions of the country. Interestingly, *M. acuminata* and *M. balbisiana*, the parent species of the cultivated banana are both present in Sri Lanka.

There is also considerable genetic variation among a wide range of fruit crops such as citrus, mango, avacado and jack that are grown mainly in home gardens. Other fruit crops such as durian, pomegranate, rambutan, guava and papaw have also been in cultivation for a long time and exhibit a wide range of genetic diversity. Fruit crops such as wood apple and velvet tamarind are a source of income for the dry zone farmers, and are harvested from forests for sale. Of concern is the fact that harvesting of the latter species from forests is destructive as it involves chopping down of large fruit bearing branches to facilitate collection. Sri Lanka has a large number of vegetables, including both temperate and tropical species, cultivated throughout the country. Among these, cucurbits, tomato and eggplant exhibit high genetic diversity. There are also a fair number of root and tuber crops, of which cassava, dioscorea and innala show considerable genetic variation. Sweet potato, although introduced to this country, is naturalised and has high genetic variability.

9. Ex situ Conservation

With regard to *ex situ* conservation of agricultural germplasm, this activity was placed on a sound scientific footing by the setting up of the Plant Genetic Resources Centre for cryo preservation of plant germplasm. Other institutions carrying out *ex situ* conservation of food crops, but only as field gene banks, are the Horticultural Crops Research and Development Institute (for fruit and vegetable species, root and tuber crops), the Rice Research and Development Institute (for rice genes), and the

Field Crop Research and Development Institute (coarse grains, grain legumes and condiments). These institutes are under the Department of Agriculture. The Department of Export Agriculture maintains germplasm of coffee, cocoa, cardamom and clove. There is an inadequacy of field gene banks for traditional species of fruits (e.g. madan, atamba, divul, and himbutu), grain legumes, and medicinal plants. The economy of Sri Lanka has been long dominated by plantation crops, mainly tea, rubber and coconut.

Tea germplasm, originally introduced from Assam in 1839, has undergone selection through breeding programmes, and the selected genotypes are being conserved in numerous breeding stations and tea estates in the country. Selection and vegetative propagation have resulted in a series of high-yielding tea clones that are resistant to pests, diseases and drought, and have high rates of fermentation.

The rubber plantations in Sri Lanka were initially derived from a highly inbred selection of lines derived from South American seedlings introduced to the country in 1876. Clonal propagation of these lines for selected characters narrowed down this genetic base until 6000 new accessions were introduced from Malaysia in the early 1980s from a special collection of wild *Hevea* germplasm brought in by the International Rubber Research and Development Board from Brazil. With regard to coconut, a number of new varieties and hybrids have been developed in Sri Lanka, and much of this work has been carried out by the Coconut Research Institute. The three crop plantation research institutes and the Sugar Research Institute conserve their respective germplasms as live genebanks at their field stations.

Sri Lanka also has about 170 species of plants of ornamental value, of which about 74 species are endemic. Notably, the natural habitats for several *Dendrobium* and *Vanda* species and many foliage plants of commercial value are the wet zone forests of the country. In the livestock industry, the animals commonly reared comprise cattle (1,644,000), buffalo (760,900), goats (535,200), sheep (11,400), pigs (84,800) and poultry (9,136,600).

The indigenous cattle have very low genetic potential for milk production, but are resistant to diseases and have the ability to feed on coarse grasses. Several foreign breeds of cattle have been introduced to the country over the last four decades in an effort to boost milk production. With regard to the local breed of buffalo, there is as yet some uncertainty about its origins. Although it has been stated that it is not indigenous and the wild form is feral, recent evidence from fossil discoveries indicates the existence at some time in the past of an indigenous species of buffalo identified as a swamp type. It is believed that over 95% of the buffaloes in the country are the indigenous "Lanka Buffalo", while the rest are of foreign origin and belong to the river type. The exotic breeds are the Murah and Surti from India and the Nili-Ravi breed from Pakistan. Little is known about the indigenous varieties of goats, sheep and pigs, and there have been only few efforts to identify and conserve gene pools of these breeds.

The local backyard breed of scavenging poultry that is resistant to tropical diseases and commonly found in many village households prior to 1960s is fast disappearing due to the strong preference for imported germplasm. Efforts have been made by the Department of Animal Production and Health and the Veterinary Research Institute (VRI) to conserve the indigenous animal species of economic value, but they are constrained by insufficiency of funds and infrastructure. The private sector plays

an important role in the maintenance of germplasm of livestock, particularly of poultry, and it regularly imports exotic germplasm.

10. Community Participation in Biodiversity Conservation

As all we know, biodiversity conservation should be an integrated process with active participation of all stakeholders. The communities living around the protected areas have a greater role to play in conservation of biodiversity in protected areas. Both forest department and wildlife department developed management plans for protected areas and buffer zone management is an important intervention in all these plans. Communities living around protected areas have to understand the value of conservation of the protected area and need to minimise dependencies on natural resources of the forests.

Alternative livelihood development for families directly and indirectly depending on forest resources is a very important intervention in these management plans. Microfinance Institutions (MFIs) and development agencies could play a very important role in these processes by supporting families to develop alternative livelihoods to reduce dependency on forest reserves. Promoting home garden level cultivation of medicinal plants and ornamental plants for sales indirectly contribute to *ex situ* conservation. MFI and development agencies could assist local farmers to grow ancient varieties instead of hybrids, which is also a very good intervention for conservation of agricultural biodiversity. There are many other interventions that can be done by MFIs as well as development agencies to conserve agriculture biodiversity in a country.

Agricultural Biodiversity Community (abc)

Agricultural Biodiversity and Climate Resilience

Sixth Annual Meet

Venue	:	Pastoral Centre, Mananthavadi, Wayanad, Kerala, India
Dates	:	14 - 17 December 2016

Goals

1. Taking on board the current and new members of abc and get their enthusiastic support for taking abc forward
2. Facilitate exchange and learning on (local, national, regional and international) experiences and reflections on the theme of ***Agricultural Biodiversity and Climate Resilience***
3. Preparation of action plan for 2017
4. Learning about interesting and insightful agricultural biodiversity initiatives in Western Ghats, Wayanad, Kerala, India

Agenda

Day 1

Visiting Good Practices Fostering Agricultural Biodiversity

The first day of the meet is dedicated to visiting some of the good practices being carried out in the field by practitioners to further agricultural biodiversity.

Time

09:00 am Registration

09:30 am Overview about field visit

10:00 am Leave for field visit

Site 1: Community Agro-biodiversity Centre, M.S. Swaminathan Research Foundation

Location: Puthoorvayal PO, Kalpetta, Wayanad, Kerala 673 121,

The Centre works on trans-disciplinary methodology in understanding the community biodiversity management practices, and integrating four key dimensions of community biodiversity management - conservation, cultivation, consumption and commerce. The Centre works on Biodiversity conservation and enhancement, biodiversity education and communication; biodiversity based sustainable livelihoods and food security.

Visit: www.mssrfcabc.res.in

Facilitator: Dr. Gopal (+91 9656102590)

Site 2: Wayanad Social Service Society

Location: Mananthavady, Wayanad, Kerala.

WSSS has been conserving traditional pepper varieties, promoting diversity of plantation crops and spices in homestead gardens and organic production. Facilitating market linkages and export-oriented marketing, processing centre. It has built ethno medicinal forest with collection of species, a museum of herbs and seeds.

Visit: www.wsssindia.com

Facilitator: Fr. Bijo Thomas Karukappally (+91 9744066518)

Site 3: Gurukula Botanical Sanctuary and Cheruvayal Raman's farm

Location: Peria, Wayanad, Kerala.

The Gurukula Botanical Sanctuary is dedicated to the plants of the Western Ghats, a mountain range running down the western coastline of peninsular India. The Sanctuary is a garden of wild plant species grown at the edge of a rainforest reserve. It works for rehabilitating endangered species and restoring habitats in a highly fragmented landscape, in which only a fraction of original forest remains and a high percentage of species are rare, vulnerable or threatened by imminent extinction.

Cheruvayal Raman is a farmer involved in conserving more than 30 traditional varieties of paddy with his own effort.

Visit: http://www.gbsanctuary.org/

Facilitator: Suprabha Seshan (+91 9448059414)

Pointers for Reflection

- Good and next practices observed in the field and their relevance to agricultural biodiversity and climate resilience.
- Learning drawn out of field visit and potential activities emerge as takeaway for integration and adaptation.
- Challenges for scaling up, replication and mainstreaming observed practices

Groups for field visit

Site 1 Community Agro-biodiversity Centre, M.S. Swaminathan Research Foundation	Site 2 Wayanad Social Service Society	Site 3 Gurukula Botanical Sanctuary and Cheruvayal Raman's farm
1. Mr. Krishnaprasad	1. Ms. Sonali Bishit	1. Ms. Ana Galvis
2. Ms. Edith Van Walsum	2. Mr. Joy Daniel	2. Mr. Thomas Mupetesi
3. Ms. Kamolpatara Kasikam	3. Mr. M. Karthikeyan	3. Ms. Anne Maina
4. Mr. M.P. Vasimalai	4. Ms. Mathana Aphaimool	4. Mr. Frank Heckman
5. Ms. Maede	5. Mr. Kihoro Geoffrey Kahuho	5. Mr. P. Krishnamurthi
6. Mr. Julian Teeler	6. Mr. J. Mohan	6. Mr. R. Adhinarayanan
7. Mr. Vignesh (Video)	7. Mr. Rajkumar (Video)	7. Mr. T. Veerapathiran (Video)
8. Mr. Sundararajan	8. Mr. Radhakrishnan	

Days 2 & 3

15 & 16 December 2016

Time	Content	Facilitation
09.00 am	**Opening ceremony**	Frank Heckman, Embassy of Earth
10.00 am	Welcome address Opening remarks Sharing the meeting objectives and agenda	Chairperson, WSSS M.P. Vasimalai, Chairperson, abc Steering Council. R. Adhinarayanan, Secretariat, abc@DHAN Foundation
11.00 am	**Health break**	
11.30 am	Introduction to abc History of abc and works done so far Small group sharing of experiences related to agricultural biodiversity Updates of progress after the Thika meeting	*Sonali Bisht and Thomas Mupetesi – abc Steering Council members* Frank Heckman M. Karthikeyan, DHAN Foundation
13 00 pm	**Lunch**	
 14.30 pm 15.00 pm	Skype sessions: Policy advocacy – Patrick Mulvany Resilient communities – Jamila Haider	 Frank Heckman R. Adhinarayanan
15.30 pm 16.30 pm 17.30 pm	**Agricultural Biodiversity and Climate Resilience** Lead paper Panel discussion Forest biodiversity and climate resilience Fisheries diversity and climate change Sub-group discussion on links between abc and climate resilience and their evidences, and action plan for 2017 for strengthening the links a. Seeds, breeds and technology – Climate resilience b. Markets and trade – Climate resilience c. Policy and communication – Climate resilience Plenary discussion	**Panel:** M.P. Vasimalai and Edith Van Walsum Edith Van Walsum, Director ILEIA Dr. Sunil Liyaange Julian Teeler Sonali Bisht, M Karthikeyan Krishna Prasad, Jeff, Fr. Bijo Edith, Krishnamurthi, Thomas
21.00 pm	Story telling	Frank Heckman

Day 4

17 December 2016

Knowledge Building Workshop on

Farmers-led Agricultural Biodiversity Conservation for Climate resilience: *Learning lessons for future practice*

Venue: Bhrimagiri Hotel, Manathavady

Agenda

09 15 am	Registration
09 30 am	**Welcome and Introduction** - M. Karthikeyan, Programme Leader, DHAN Foundation
	Theme introduction – M P Vasimalai, Chairperson, abc
	Inaugural address: Frank Heckman, Embassy of Earth
10 00 am	**Presentation on Wayanad Agricultural Biodiversity initiatives** • Community Agrobiodiversity Centre of MSSRF • Wayanad Social Service Society • Cheruvayal Raman & Gurukula Botanical Sanctuary
11 30 am	Tea break
11 45 am	**Farmers presentation** • Kani Tribals – Dakshinamoorthy, Tirunelveli district, Tamil Nadu • Farmers from Mysore, Karnataka - T. Ramachandraiyah
12 45 pm	**Panel discussion:** International Experience Chair: M P Vasimalai • Maede, CENESTA, Iran • Geoffrey Kahuho, PELUM, Kenya • Thomas Mupetesi, FACHIG, Zimbabwe
01 30 pm	**Way forward** • Edith Van Walsum, ILEIA • Ana Galvis, MESA • Krishna Prasad, Sahaja Samrudha
02 00 pm	**Lunch**

Participants

S.No	Name	Organisation	Country
1	Sonali Bisht	INHERE (Institute of Himalayan Environmental Research and Education)	India
2	Anne Maina	Kenya Biodiversity Coalition (KBioC)	Kenya
3	Maede Salini	CENESTA - Centre for Sustainable Development & Environment	Iran
4	Kihoro Geoffrey Kahuho	PELUM - Participatory Ecological Land Use Management	Kenya
5	Thomas Mupetesi	FACHIG Trust - Farmers' Association of Community Self-help Investment Groups	Zimbabwe
6	Ana Cecilia Galvis Martinez	MESA - Multinational Exchange for Sustainable Agriculture	USA
7	Joy Daniel	IIRD - Institute for Integrated Rural Development	India
8	Mohan. J	STFF - Singampunari Tank Farmers Federation	India
9	Karthikeyan. M	DHAN Foundation	India
10	Julian Teelar	SIFFS - South Indian Federation of Fishermen Societies	India
11	Mohsin Ali	WAVE Foundation	Bangladesh
12	Chelladurai. P	Coconut Producer Organisation, Pudukottai	India
13	Dr. Sunil Liyanage	CB Lanka Micro-finance	Sri Lanka
14	Mathana Aphaimool	Earth Net Foundation	Thailand
15	Kamolpatara kasikrom	Wanakaset Network	Thailand
16	Krishna Prasad	Sahaja Samrudha	India
17	Radha. T.M.	AME Foundation	India
18	Fr. Bijo Thomas Karukappally	Wayanad Social Service Society	India
19	Vasimalai. M.P	DHAN Foundation	India
20	Leneesh. K	Thanal	India
21	Krishnamurthi. P	DHAN Foundation	India
22	Adhinarayanan. R	abc Secretariat, DHAN Foundation	India
23	Biju. K.J	Wayanad Social Service Society	India
24	Biju T.F	Wayanad Social Service Society	India
25	Shankar Prasad. K	MVVGSCS- Magadi Vayalagam Vegetable Growers Souharda Co-operative Society	India
26	Ganganarasimhiah	Farmers, Magadi Vayalagam Vegetable Growers Souharda Co-operative Society	India
27	Ramchandraiah. D		
28	Ramakrishnappa		
29	Nanjappa		
30	Sathar		
31	Shajumon	WSSS	India
32	Suma. T. R	CABC - Community Agro-biodiversity Centre, MSSRF	India
33	Sharon Thomas	Wayanad Social Service Society	India
34	Ashna Thomas	Wayanad Social Service Society	India
35	Charles. N.J	Wayanad Social Service Society	India
36	Sindhu. PD	MMKO - Masanikamma Mahila Kalanjia Okkuta	India
37	Rajagowda. T	Organic Farmer, Masanikamma Mahila Kalanjia Okkuta	India
38	Govindagowda	Masanikamma Mahila Kalanjia Okkuta	India
39	Venkatesh. T.V	Masanikamma Mahila Kalanjia Okkuta	India
40	Swamy Gowda	Masanikamma Mahila Kalanjia Okkuta	India
41	Anand. M.M	Malavalli Bluff Mahila Kalanjia Okkuta	India
42	Mahadeva. D.H.	Masanikamma Mahila Kalnajia Okkuta	India
43	Sivasomasundaram. S	DHAN Foundation	India
44	Thekshinamoorthi	Kani Tribal Leader	India
45	Ganesamoorthi	Kani Tribal Leader	India
46	Gowshik	DHAN Foundation	India

Agricultural Biodiversity Community

Agricultural Biodiversity Community was initiated as part of a joint Hivos and Oxfam Novib Knowledge Programme, Agrobiodiversity@knowledged, initiated in 2011. This Knowledge Programme aims to break through the barriers that limit the scaling up, institutional embedding and horizontal extension of practices that build on agricultural biodiversity for improved livelihoods and resilient food systems. abc was constituted by diverse organisations and individuals working on agricultural biodiversity with millions of farmers worldwide, where evidence and insights are generated, shared and tested. The knowledge programme aims to synthesize knowledge from a local to a global scale, conduct research on approaches and analytical frameworks that provide new perspectives on agricultural biodiversity and its role in resilient socio-ecological food systems, and improve horizontal and vertical knowledge flows towards positive change and transformation.

- The first meeting in 2011 held at Thika, Kenya established the state of knowledge around agricultural biodiversity. Identified knowledge gaps, common ground and support needed for the development of abc.
- In the second meeting in 2012 organised at Wongsanit Ashram, Thailand, Strong foundations was laid by way of formulation of a shared vision and mission, identification of the five strategic themes for action and joint development of action plans to achieve goals of the community and created platform for communication.
- In the third meeting in 2013 organised at Madurai, India tangible knowledge products relevant to abc and beyond were evolved and members have contributed to Farming Matters Magazine.
- The fourth meeting held at Boxtel, Netherlands in 2014 focused on creating momentum for change towards agricultural biodiversity at scale by strengthening abc to become a professional action-learning community. Also it worked for advancing three themes namely resilience self-assessment, open source seed system, and influencing policy.
- Again in Thika, Kenya abc in 2015, the fifth annual meet was organised with the focus on institutionalizing abc, working group mechanisms and strengthening the member base.

Sixth Annual Meet on Agricultural Biodiversity and Climate Resilience

The sixth annual meet was organised in Wayanad, Kerala in India. Forty seven participants including members of abc, representatives of farmers federations, practitioners attended the meet. Taking cues from the past meetings the abc focused on the issues, challenges, opportunities and way forward in the context of climate resilience and agricultural biodiversity.

Unity for Diversity

agricultural biodiversity community

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