Eco-cultural maps and calendars: Tools for mobilization of local knowledge and connecting diverse knowledge systems

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Introduction

This report details the processes that two communities went through with the aim of mobilizing and validating their own knowledge, in order to secure local heritage and continue customary sustainable practices in management of it towards endogenous development. The project also assisted the communities to assess the status of resilience of local social-ecological systems and to develop restoration plans including showing areas where connecting different knowledge systems may support the restoration.

The process is part of a pilot project to test the Multiple Evidence Base approach[1] from the ground in communities in five countries as a tool to mobilize and revitalize indigenous and local knowledge, and for connect across knowledge systems. See further Box 1.

Methods

Communities drew eco-cultural maps and calendars (see Box 3) of the past and present which showed the different statuses in the health of their ecosystems in the two temporal phases. They also brought out the customary ecological laws which were used to protect local ecosystems and discussed the status of their use and respect in the present times. Finally, they drew eco-cultural maps and calendars of the future which envisioned the desired state of their ecosystems and the actions to take to realize it. The actions included opportunities to complement the indigenous and local knowledge with outside sources of knowledge such as scientific knowledge when needed for enhanced governance of the ecosystems.

The eco-cultural approach (involving community dialogues and development of eco-cultural maps and calendars) used in the pilot enabled the distilling of indigenous and local knowledge and practices as well as realizing a broad intra-community validation process. Eco-cultural maps and calendars reveal the deep geography, the cultural vision and meaning of the territory, as understood by communities over time. The maps and calendars enable the wider community to develop and hold a collectively agreed vision of the relations of elements that interact in the territory over time. On the other hand, community dialogues are an important aspect for local governance and consensus building, as most community processes require broad-based agreement for their effective implementation. Dialogues can take different forms and participation – either whole community or a specific sector of the community. They provide the community with a good opportunity for joint reflection, analysis and consensus building on priority actions. Such a cultural approach (involving community dialogues, eco-cultural mapping as well as development of traditional seasonal maps) is important in order to maintain the integrity of indigenous and local knowledge as envisaged by the MEB process (see Box 1), in order to avoid further marginalization by science.

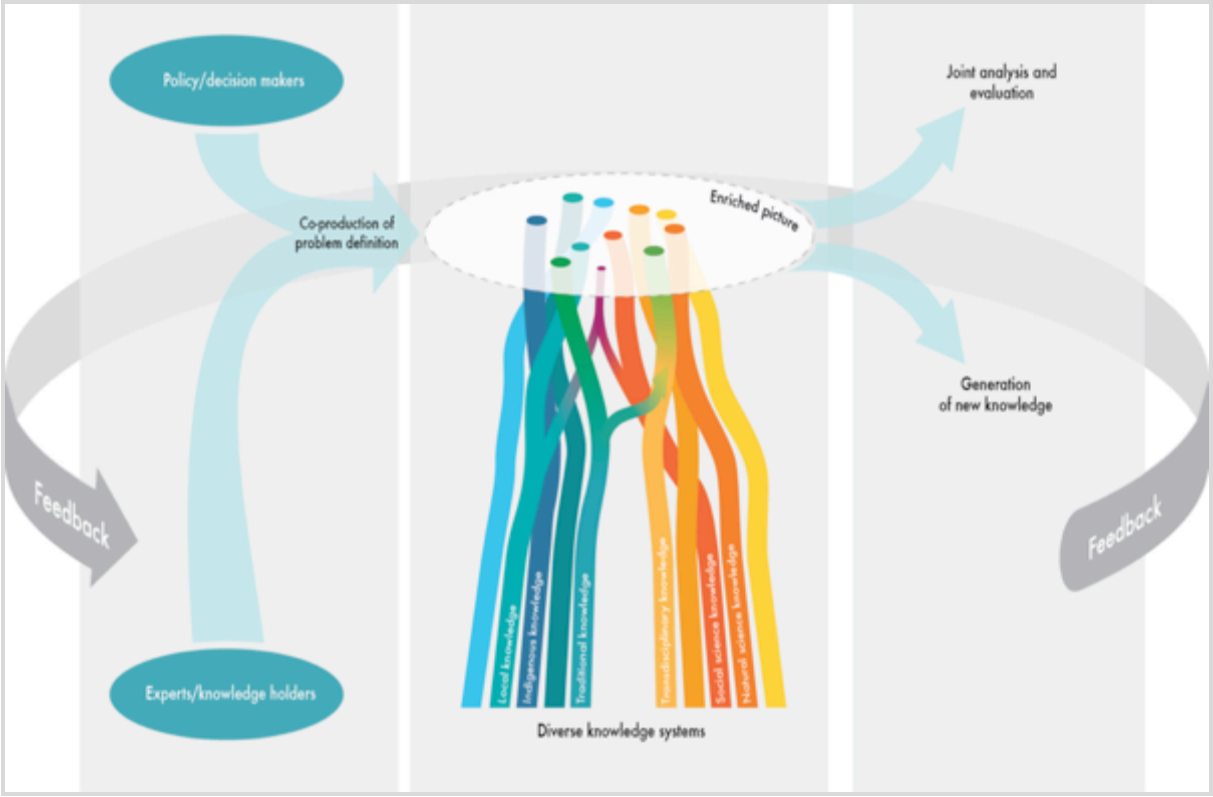
Box 1. The Multiple Evidence Base (MEB) approach views indigenous, local and scientific knowledge systems as generating different manifestations of valid and useful knowledge which should be jointly analysed. Indigenous and local knowledge systems can provide valid and greatly needed knowledge to enhance governance of ecosystems, at local levels as well as in global science-policy fora such as the IPBES and the CBD. However, connecting knowledge across scales and epistemologies in ways that are equal, transparent and legitimate

[1] See also: http://www.stockholmresilience.org/21/policy--practice/swedbio/dialogues/guna-yala-dialogue/multiple-evidence-base.html

remains a challenge given the ethical requirement to consciously maintain the integrity of each knowledge system involved in such inter-knowledge connections. Where indigenous and local knowledge and science have interacted in the past, the practice has been that science insubordinates the rest.

However, this practice has been reviewed at the global and national levels, especially with the realization that indigenous and local knowledge and attendant cultural practices can make huge contributions towards addressing global challenges such as climate change, loss of biodiversity, hunger and famine. The IPBES, CBD, IUCN, UNDRIP and the Global Movement on the Rights of Nature are among the myriad international initiatives working towards recognition of the contribution of indigenous and local knowledge in ameliorating these challenges. At the national level, a number of countries across the world have created significant legal frameworks for this purpose, to the extent of anchoring some of these opportunities in the national constitutions and laws. The unfortunate thing is that in some countries, such opportunities are provided in one law and denied in another. Further, current approaches to ecosystems governance continuously fail to consider the processes required to mobilize knowledge across scales and contexts in order to enhance ecosystems governance. In the midst of all this, it is re-assuring that IPBES and CBD especially provide specific opportunities for indigenous and local knowledge systems to contribute alongside science in the governance of ecosystems, and the MEB approach is contributing to make this a reality.

The figure below outlines 3 phases of a Multiple Evidence Base approach that emphasizes the need for co-production of problem definitions as well as joint analysis and evaluation of the enriched picture created in the assessment process. Phase 1 Concerns defining problems and goals in a collaborative manner. Phase 2 entails bringing together knowledge on an equal platform, using parallel systems of valuing and assessing knowledge, and Phase 3 is the joint analysis and evaluation of knowledge and insights to generate multi-level synthesis and identify and catalyze processes for generating new knowledge.



Aim

The overall aim of the project is to support communities in mobilizing, distilling, experimenting, validating, presenting and revitalize their own knowledge and experiences related to ecosystem governance on their own terms, by zooming in on agro-biodiversity, food and culture. It also aims at supporting communities to clarify their common position and consciously maintain the integrity of indigenous knowledge. Finally, the project aims at supporting initial dialogues between knowledge systems in jointly identifying and formulating the problems.

To this end, two pilot sites were identified in Tharaka and Masinga where the Institute for Culture and Ecology (ICE-Kenya) is working. The two areas are 121 km apart, and are both semi-arid zones. In Tharaka, the focus was on customary ecological law and governance and how this can be used alongside conventional law to enhance the resilience of social-ecological systems. The focus was on Kathita River and the main strategy was eco-cultural mapping. In Masinga, the focus was on the interactions between agro-biodiversity, food, culture and nature, and how this interaction can contribute to the resilience of the social-ecological system. The process focused on sacred sites/earth spirituality, indigenous seeds and water, with eco-cultural calendar being the main strategy.

The following sections provide background information on each site, how the process has unfolded in each area, and the outcomes so far.

Tharaka region

Background Information about the region

Tharaka lies on the low plains between Mt.Kenya on the West and the Upper Tana River in the east. The area is mainly plains, with major ecosystem type being scrub land. The area is generally hot, with unreliable rainfall which quite often leads to crop failure.

Tharaka Constituency straddles in 1,513 square kilometres land mass and has a population of 130,098 persons according to 2009 Kenya National Census. Due to climate change, rains have become erratic in the area. The area experiences a bimodal rainfall pattern with annual rainfall averaging between 500 - 800mm per year. The rain seasons in Tharaka are very unique from the rest of the country. Unlike other parts of the country, the short rains are from March to May (*Nthano Season*) and the long rains in the area are experienced from October to December (*Muratho Season*). This season is traditionally the beginning of the Tharaka New Year and whatever happens in the rainy season sets the pattern for the whole year. Tharaka is generally semi-arid with short trees. Forests are found on the mountains only.

Harvests for the seasons are done in January and June respectively. Food crops cultivated in the area are millet, sorghum, maize, pigeon peas, green grams and cow peas and they serve as the staples. Domestic fruits prevalent in some parts of Tharaka are mangoes, bananas, oranges; and wild fruits such as tamarinds, sycamores, figs, and many others. Cash crops are hardly cultivated but if done, they comprise cotton, sunflower and castor. Aatharaka keep goats, sheep and cattle too. General temperatures in Tharaka are hot ranging between 29oC - 36oC, though at certain periods they can rise to as high as 40oC.

However, the territory is currently under huge threat from climate change. Most of the 13 rivers that run through the territory have now become seasonal. Kathita River, the main river on the territory and a water source for many households, is also threatened by excessive abstraction along its course, destruction of the riverine vegetation, destruction of catchment area, damming and pollution. The sacred sites along Kathita River have been destroyed, and traditional

ecological law[2] is not followed due to influence of new faiths and education. The territory is on the verge of losing its socio-ecological resilience, with recurrent drought and famine taking a ritualistic cycle. While many development programs have been introduced in the area, the situation seems to be getting worse. The local people, led by clan-based custodians of sacred natural sites, have come together to contribute from their indigenous knowledge and practices to find ways of protecting the river.

Box 2: Description of Kathita River

Flowing from the slopes of Mt Kenya, with its origins at Rutundu, the Kathita River cuts a meandering trajectory across the length and breadth of Meru and Tharaka-Nithi counties. It empties its waters in to the Tana River at Kibuka; with the Tana River flowing onwards into the Indian Ocean.

Besides sustaining life and driving forward the economy of Tharaka, Kathita River is of paramount importance, culturally and spiritually, to the people who live adjacent to its riparian reserve. For ages, it has informed their way of life as it contains close to fourteen *iri*- sacred natural sites- where they have communed with their God, *Mwenenyaga*, and where the spirits of their ancestors rest.

Traditionally, it is in these sacred sites that prayers were held to ask for blessings, cleansing the land, thanksgiving, and other requests. Kathita River also played a central role in other cultural rites and ceremonies such as circumcision and marriage.

Sadly, the river is drying up! As it winds its way slowly to join Tana River, with its diminishing waters falling down the falls, one can feel its lethargy, a sense of defeat. In some parts along its course, one can clearly see the river bed as the waters have been reduced to a mere trickle. At its confluence with Tana River at Kibuka sacred area, it presents a study in contrast in that it shyly enters the Tana River; as though embarrassed at the little waters it gifts the Tana River while Tana's other tributaries gush in torrents.

Kathita River has been reduced to this sorry state by multiple threats to it. These include pollution, diversion of its upstream waters for irrigation, drying up of its tributaries, deforestation along its banks, sand harvesting, and declining rainfall amounts - all which continue to strengthen the chocking grip of climate change. Soon, Kathita River may turn into a distant memory- with great ramifications to the people of Tharaka, their livestock and crops – indeed to life in the region.

The eco-cultural mapping process 2014 - 2015

The preparatory phase January – August 2014

The success of an eco-cultural process[3] is determined by the amount of preparatory work done with communities in the remembering and validating of their traditional ecological knowledge

[2] Traditional ecological law is customary law which deals with protection of ecosystems

[3] Eco-cultural process denotes an analysis of interactions between a people's culture and their immediate environment. In this case the process reviewed the way the people of Tharaka have interacted with Kathita River over time.

and practices. Eco-cultural mapping begins with community dialogues[4] which are aimed at mobilizing people to validate and believe in their own knowledge. A series of such dialogues were carried out from January to August 2014, bringing together people from all the sacred sites along Kathita River. Other key stakeholders including local administration, county leaders, government institutions and agencies and local community-based organizations (CBOs) working in the region were mobilized. This was an important phase as it prepared different groups from different knowledge systems to start thinking about the river and the challenges it is facing before the mapping event.

Through these dialogues, it also became clear that custodians of sacred sites come from four out of the thirty two clans which comprise the community. These four key clans were supported to meet to validate and clarify their ancestral role in ritual practice and protection of sacred sites along Kathita River. They discussed the relationship between the fourteen sacred sites, and their relationship with celestial bodies as well as crops and animals. They discussed the traditional governance issues and the place of clans in ritual practice, and what this meant for enforcement of the traditional ecological laws. The clan-based custodians visited each other in order to validate the knowledge they were bringing back, as they are the embodiment of this knowledge. During their discussions, they identified a total of thirteen sacred sites along the course of Kathita River, from the source to the confluence with Tana River. They then started documenting stories and laws of origin associated with these sacred sites, which were to be used discussed during the mapping event as well as to seek recognition and registration of the Kathita as a sacred river.

A key outcome of the dialogues between the custodians from the four clans was the formation of a Coalition of Custodians. The coalition was meant to consolidate and amplify their voice in campaigning for the protection and recognition of Kathita River as a sacred river. They started holding meetings to plan for the mapping event, as well as how to involve the youth in order to ensure sustainability of this process. The coalition was formalized in July 2014.

The custodians also managed to clarify the different but important spaces for men (Rwamba) and women (Kibuuru) in protection of sacred sites. They identified the weakened traditional initiation and clan governance system as the main culprits in differential integration of youth into the system for protection of sacred sites.

The mapping event August 2014

After seven months of dialoguing and processing among the communities along Kathita River, the mapping event happened in August 2014. The event brought together representative custodians from the four clans (which are culturally mandated to relate with the sacred sites on behalf of the whole community), representatives of government departments and the National Museums of Kenya (which has a specific task to gazette sacred sites). The process began with a traditional ritual conducted by the elders (both men and women) at the *Ndiairi* Sacred Natural Site. The ritual welcomed the rains, good harvest of millet, sorghum, cow peas, and pumpkins

[4] A community dialogue is a space in which participants from different sectors of the community come together for a face-to-face discussion of common issues of concern. It clarifies different perspectives and also develops commonly agreed responses to the common issues of concern. In this case the dialogues were used to for the people of Tharaka to validate their traditional knowledge of management of rivers and sacred sites.

Box 3: Explanation of eco-cultural mapping

Eco-cultural mapping is a participatory process for communities which aim to reveal the deep geography, the cultural vision and meaning of their territory. It develops a collective vision which can help in the reconnection with the past and the understanding of the present and the visioning of the future. The preparation stages before beginning mapping are extremely important for the success of the mapping exercise. The deeper the process of reflections before the exercise, the clearer the elaboration of the maps and the easier it gets to develop eco-cultural calendars. The maps are critical in helping the wider community to hold a collectively agreed vision of the relations of different elements that interact in the territory over time.

Logical process of eco-cultural mapping:
Map of the ancestral past: it helps to bring back the original knowledge and the ancestral order. It shows the way the ancestors used to live according to customary laws, distilling their culture from interactions with the territory. It provides inspiration when drawing the map of the desired future. In the case of Kathita River the map of the future the group drew aimed to restore the degraded river ecosystems to a level close to the map of the ancestral past. .

Map of the present: it facilitates the analysis of the impacts, transformations and changes that the territory has suffered over time. It includs the modern state and the new structures and foreign ways of governing which has been brought to the territory.

Map of the future: it depicts the desired state of the territory which the community envisions and agrees to move towards. In the case of Kathita River the map of the future is accompanied by envisioned actions, processes, restoration initiatives, ways for recreation and resurgence. Its development presents an opportunity to examine strengths, weaknesses and potentials in the light of the maps of the past and of the present. The conclusion of the map of the future consolidates future plans or community ecological governance plans. The map also helps to move forward towards a local, collectively agreed and connected future.

and other indigenous crops. The welcoming ritual was followed by a great dance in praise of Kathita River and the general ecosystem.

The group then had a general discussion on eco-cultural mapping and calendar development process to ensure all participants were starting on the same footing. They also discussed the aspects to appear on the maps and calendars of the past, present and future, in order to develop consensus. They then divided into three groups to draw the maps of the past, present and the future and the corresponding seasonal calendars.

After every so often the groups would come back together to check on progress and offer space for validation and to contribute on each of the different maps and calendars. The comments made would be considered by each group. Song and dance in praise of Kathita River and the entire Tharaka territory would punctuate the process, to bring back the memory of certain aspects of traditional ecological knowledge and governance.

Once all maps and calendars were completed, the participants came together and reviewed each map and calendar at a time. The maps made it easy to understand the different phases and share the feelings about the overall picture presented by the maps. Joint mapping by local/indigenous community and representatives from various government departments was a trust-building process which brought down all communication barriers between the two groups, which would often be visible in other forums where working together would be challenged.

Figure 1: An eco-cultural map of Kathita River as it was in the past

The map of the past presented a beautiful scenario when the river was well protected and had a rush green riparian reserve, bubbling with life in the form of vegetation, animals, birds and even aquatic life. The river water volumes were quite impressive according to the elders who had the opportunity to witness. During that time, everyone was expected to adherence to traditional ecological laws. The few who did not adhere were fined or severely punished in order to deter destruction of the sacred sites. The map of the present was a reflection of the current status – a diametric opposite of the map of the past – with degraded and lifeless sections of the riparian reserve, diminishing river water volumes and defiance to traditional ecological law. The map of the future represented the common vision embraced by the different knowledge systems of a restored river bubbling with life and promise again.

Together the communities analyzed the possible causes of the situations presented by the three maps. They were quite surprised by the glaring contrast between the maps and calendars of the past and those of the present. The map of the present times presented the stark reality of destruction that has happened over time, and all participants agreed that the river was faced with a serious threat of disappearing. Using the map of the future, they envisioned a future in which the river would undergo restoration to a scenario *analogous* to the map of the past. However, the group appreciated the possible tensions especially with landowners who may view the restorative activities as trespass on their farms. They also identified possibility of resistance by farmers who are flouting existing abstraction guidelines as well as those who have installed illegal abstraction points.

Figure 2: Eco-cultural calendar of the past

Using the eco-cultural mapping process, different knowledge systems (local people represented by clan representatives, practitioners represented by different NGOs and other civil society

groups, government administration officers, and western science represented by representatives of different government departments) were able to jointly identify and analyze the challenges facing the river. The degradation of Kathita River begun with land adjudication when sacred sites were allocated to individuals instead of being designated as community land. Under such circumstances, community members would be denied access to such sacred sites for their rituals, which made the sites weak. This also weakened the traditional ecological law, which could not be enforced by the custodians on private property. The land owners then failed to protect the riparian reserves and opened their land to the banks of the river for agriculture and grazing, exposing the banks to severe soil erosion. The Water Resources Management Authority (WARMA) the body charged with management and protection of rivers, failed to enhance the policy guidelines on abstraction of water from Kathita. Many illegal abstraction points were installed and those which are legal are not following the laid down regulations. The combined impacts of these failures have caused significant reduction of river water volumes and the imminent drying up of the river.

After this joint analysis, they held an intense dialogue on the future map and calendar, with regard to the actions they would take in order to reverse the trend of environmental degradation of Kathita River and its riparian areas. They then identified land owners and illegal abstraction points as important problem areas, which they would need to deal with to ensure success of their initiative. Finally, they identified all sectors of government that would be necessary to engage in order to have the actions implemented.

The last day of the eco-cultural mapping was dedicated to celebration and presentation of the maps to the wider community (representing all the clans) and other local government representatives. The maps and calendars were presented in a big community meeting which was used to adopt the outcomes of the mapping event by the wider community. The government representatives committed to support the local actions. The community then developed a statement calling on all sectors of society including the government to support the action plan at their own levels.

Celebration is an integral part of the life of Tharaka people. The process ended in a celebratory mood with local food, song and dance. *Mugwe*, the spiritual leader of Tharaka people from *Kithuri* clan, did the closing ritual where he also prayed for just rains and a good harvest. On the evening of this last day of the event, rains came to bless the work done over the past week, which was a sign that God and the ancestors concurred with the week-long deliberations.

Implementation of the action plan

The community has been very active in following up and implementing the action plan that was developed during the mapping event. They followed up with Water Resources Management Authority (WARMA) to identify illegal abstraction points. WARMA and the community representatives have planned to walk up the river and do exactly this. The community also met with their local administrators to discuss strategies for reaching out to land owners who are allowing destruction of riparian reserve. The community is raising tree seedlings and distributing them to those land owners to plant on the riparian reserve.

Working together with the Institute for Culture and Ecology (ICE-Kenya), the community has secured the support of National Museums of Kenya (NMK) to document the sacred sites on Kathita River and petition the government to list the whole river as sacred. The documentation process happened in May 2015. Similarly, ICE and African Biodiversity Network (ABN) have assisted the community to get the services of a local person to assist them to document their traditional ecological laws and supportive legal framework at national and international level, with the aim of seeking recognition of traditional law as a viable body of law to be implemented alongside conventional law.

An interesting development is that this community has set up a community research group which is spearheading their search for relevant indigenous knowledge and biodiversity especially of food crops, which they plan to recuperate. They have also started contributing money to buy land on which they will set up a community learning centre where all relevant traditional innovations will be shared as well as for future co-generation of knowledge and joint work with conventional researchers.

Reflections on eco-cultural mapping process

- Eco-cultural mapping is a potent community-driven people and knowledge mobilization process, which leads to people believing in the potency of their indigenous and local knowledge.
- When cross-knowledge participation by a broad range of actors is considered in the planning for eco-cultural mapping, it builds trust across knowledge systems and interests, making joint problem definition and analysis easy.
- Eco-cultural maps manifest the knowledge and understanding of territory, and come as an easy and effective tool for community-based ecosystems assessments. They also assist in articulation of a set of rights and responsibilities for communities which are reflected in the actions.

Masinga region

Background Information about the region

Machakos County forms part of the previous Eastern Province. The county stretches from latitudes 00 45' South to 10 31' South and longitudes 360 45' East to 370 45 East. It covers an approximate area of 6,281.4 km most of which is semi-arid. High and medium potential areas where rain fed agriculture is carried out consists of 1,574 km2 or 26 per cent of the total area. The district has a variety of topographical features. The landscape is largely a plateau that rises from 700m to 1700 m above sea level and is interrupted by an escarpment and a series of hill masses, the highest of which is Kilimambogo or Ol Donyo Sabuk, which rises to 2,144m above sea level. Rising steeply to the north east of Athi River is the Yatta Plateau, which is broken by occasional hills. This plateau extends into the basin of River Tana. In the central part of the district is a striking series of hill masses that stretch in a roughly north-south axis. This series includes the Ol Donyo Sabuk, Kanzalu ranges, Kangundo, Mua, Mitaboni, Iveti and Kiima Kimwe. Most of these hills in Machakos are either sacred or have sacred sites.

Machakos is generally hot and dry, with two rainy seasons, the long and the short rain seasons. The long rain season starts at the end of March and continues up to May, while the short rains

season starts at the end of October and lasts till December. The annual average rainfall ranges between 500mm to 1300mm. Mean monthly temperatures vary between 180C and 250C. The coldest month is July while October and March are the hottest.

63% of the population is regarded as poor, with the perennial lack of water being the major contributing factor to the poverty. Being largely a semi-arid region, amount and frequency of rainfall in Machakos is quite erratic. The massive nature of the ground parent rock limits the potential of ground water.

Traditionally, the Kamba community was very religious. Most of the hills and some sections of rivers were sacred. Some hills had a number of sacred sites and this phenomenon is now being used by some stewards to develop an emerging philosophy of ecosystems function of sacred sites, in order to protect threatened hills. Unfortunately, the sacred ecosystems are now under threat of destruction through encroachment and religious intolerance.

ICE-Kenya has been working with the community of Kivaa to protect sacred natural sites since 2008. During the course of this work, it became apparent that potentiation of sacred natural sites would require indigenous seeds, which are used in ritual practice at the sacred sites.

Unfortunately, food production in the project site has been greatly affected by climate change and the over-emphasis on industrial farming practices. For a long time, indigenous seeds in the region were not promoted. Successive governments promoted the *'green revolution'* farming system, which emphasized on industrial fertilizers and hybrid seeds. Katumani hybrid maize was promoted as the main staple food, with indigenous crops marginalized to the extent of being referred to as orphaned crops. Most of the soils are also heavily deprived or acidic. Due to this, most households are known to afford only one meal a day, with devastating impacts on their health status. Due to neglect of traditional laws for protection of springs and rivers, most springs dried up, leaving the community extremely vulnerable to hunger and malnutrition. Under such circumstances, the resilience of this farming community is hugely threatened. However, in 2002, the government introduced the Strategy for Revitalizing Agriculture (SRA), which emphasized the use of drought tolerant crops in arid and semi-arid lands (ASALS), most of which are basically indigenous crops.

In 2013, ICE started working with the community to strengthen the whole socio-ecological system by revitalizing the sacred relationship between people and nature – potentiating and protecting the system of sacred sites in the area by sustaining the ritual cycle, bringing back indigenous seeds and cultural practices associated with them, reviving the dried up springs, mobilizing and educating people, and collaborating with other knowledge systems. This work is usually led by elders who understand the whole culture around traditional seeds. Men elders lead ritual practice with the support of women. Women elders lead on the revival of the traditional seed system since they understand indigenous seeds and their various benefits as well as traditional storage practices for effective protection from pests. The following strategies were used to identify the most important indigenous seeds, source for those which had disappeared from the territory, bulk and distribute them to farmers.

Community dialogues

As mentioned in the introductory section, community dialogues are an important aspect for local governance and consensus building, as most community processes require broad-based agreement for their effective implementation. Dialogues can take different forms and participation – either whole community or a specific sector of the community. They provide the community with a good opportunity for joint reflection, analysis and consensus building on priority actions. In the case of Kivaa, dialogues were first held with farmers and custodians of sacred natural sites separately. This was important as the farmers are a mixed faith group, with some leading an interesting syncretic life while the custodians are basically indigenous. Dialogues were therefore important to negotiate consensus between all these groups to ensure they respect each other especially when it comes to ritual practice. Fortunately, they all did not have a problem with this as they come from the same community and have testimony of incidences where indigenous knowledge has worked for them collectively. Instructively, some of them would secretly remind custodians to do rituals when they were due. It was through community dialogues that all the other strategies described below were identified.

Figure 3: A community dialogue in session

Seasonal calendars and ritual cycle

The world's original cultures relate to the reality of time and space in a natural way. Over time, they learnt how to read the cycles and protect nature by evolving appropriate ways of satisfying their human needs while enhancing the source of life. Since ancestral times, the sky and the movement of the celestial bodies have inspired humans to understand the dynamics in nature. This way, they evolved ways of understanding life so that they could weave relationships with

time in a cyclical way, and recognise how territory encompasses sacred places and elements. It is therefore very important in processes of cultural resurgence, for the calendars to capture this holistic worldview which sees the relationship between all elements. Cyclical time marks social practices, rituals and celebrations, leadership roles and the dynamic relationship between territory and culture. In this case, any eco-cultural calendar (past, present and future), encompass the "whole universe". This translates as follows:

- Outer circle shows what is happening in the cosmos, with the celestial bodies (stars and the moon etc);
- Next layer is what is happening in the ecosystem;
- The following layer of the circle shows what is going on with the domesticated crops and livestock in each season;
- The next layer is the human rituals and ceremonies.

There may be more layers the community wants to include, but the emphasis is to try to include the whole territory - including the cosmos and the humans.

Development of calendars is a continuous process which stimulates community analysis and research. However, any processes leading to development of eco-cultural calendar should ensure that just as in development of eco-cultural maps, there is a strong and inclusive process with communities where they collectively elaborate the calendars so that a deep understanding of the dynamics of the territory (past and present, with the vision of the future) is achieved before calendars are done. From the whole "universe", it is possible to zoom in to specific aspects such as doing a calendar for indigenous crops. This would facilitate more detailed research, analysis and planning by the community themselves.

Development of eco-cultural calendar in Kivaa

The first step was to hold discussions about the status of food security in their territory. The community generally agreed that traditionally they used to feed themselves to a large extent, since the climate was better than it is today. They were also using their traditional crops and other wild edible varieties of roots, vegetables, fruits and berries. However, they now faced constant challenge of feeding themselves, and were always on the government's food and seed relief programme. This dependency on relief provisions was making them dependent on the government and losing their sovereignty as they lacked control of neither the food nor the seeds which the government was providing.

They identified nine different indigenous crops each with several varieties which were important for their food sufficiency in the traditional context:

Finger millet, Sorghum, Peas, Cowpeas, Dolichols, Yams, Sweet potatoes, Millet, Pumpkins, Mongu
Some varieties of these crops had disappeared from the area completely, while those which were available were held by a few elders, and in small proportions.

Figure 4: Eco-cultural calendar developed in Masinga

Figure 5: Preparatory dialogue in Masinga before development of eco-cultural calendar

The community discussed the varieties and growing seasons for each, and the cultural practices associated with farming and the gender roles across the seasons. The community did rituals at each stage of farming – before planting to pray for rains and bless the seeds; to protect crops from pests and diseases; before harvesting to cool the new crops. This ritual cycle needed to be revived in order to assure the right context for growth of crops and a good harvest.

The final section of the discussions centred on storage of the harvests. In the recent times, the area has been hit by the challenge of pests which attack grains in storage facilities. The community has had to use expensive chemicals to protect the little grains they could store. Grain attack by pests and at times the challenge of aflatoxins was a great challenge to food security especially when they grew maize. They reflected on their traditional seed saving strategies and identified the central role of Kiinga, which was the main traditional grain storage facility. Only a handful of elders still had the skills to make the facility. These elders were requested to share this skill with the other community members.

Figure 6: Traditional storage facilities and an adopted plastic facility

Community research group

Once the community had fully agreed that they were losing the seeds which supported their food sufficiency, they decided to constitute a small group to lead the process of bringing back the seeds that had disappeared or were in small quantities. They also considered the context of growth of the indigenous crops, and therefore expanded the mandate of the research group to include the spiritual aspects of seeds, soil and water management, food and seed storage, seed multiplication and value addition. In the last two seasons, six different species of crops were brought back and are being multiplied. The group has also identified five springs that dried up when people failed to follow the traditional law of water protection. Negotiations with people on whose land the springs are found are going on to prepare the ground for cleansing rituals to happen which are expected to spring them back to life.

Training on holistic dryland farming skills

Being an arid and semi-arid region, soil fertility and water retention are twin constraints to food production that the farmers have been contending with for a long time. This scenario was compounded by the fact that farmers had been using chemical fertilizers almost entirely on their farms. The research group described above was mandated to also identify ways of supporting the farmers to enrich their soils as well. They came across a civil society organization which was promoting dryland farming techniques. They recommended the training for their farmers, which

was carried out in late 2014. This was the first instance the community sought to collaborate with a different knowledge system in this work.

The training included the following topics:

- Context of faming in dry lands
- Seed enhancement
- Improved soil fertility
- Enhanced crop production technologies for semi-arid lands
- Improving community seed systems
- Enhancing growth of traditional food crops
- Improving post-harvest management
- Technologies to improve pasture production

Figure 7: Learning dryland farming skills in Masinga

Cross-knowledge dialogue

Since introduction of structural adjustment programme (SAPs) in Kenya in the 1980s, extension services have become largely demand-driven. People go to consult government extension officers from their offices. This then means local people with knowledge that is capable to resolve specific community problems become important in their own localities. In the absence of

government extension services, Kivaa community decided to make good use of available indigenous knowledge to address the challenges they face.

Having held a number of dialogue sessions to verify indigenous knowledge and practices, the community felt they needed to start discussing with the different extension officers in their area on how they can bring the two knowledge systems to start collaborating on equal terms. They identified a number of elders with specific knowledge in the sectors of crops, culture, traditional human and veterinary medicine, and traditional ecological law. These were put into four groups going by the kind of extension services available at the sub-regional office:

1. Environment and Water
2. Agriculture
3. Health
4. Culture and Education

In March 2015, a meeting between elders and government extension officers under the four themes was held, with the aim of promoting harmony and synergy between diverse knowledge systems for enhanced ecosystem governance in Kivaa location in Machakos County. The meeting provided a platform for representatives from different knowledge systems (indigenous, local and western science) to discuss how they would synergize their work for the benefit of the people with respect for each knowledge system. A number of examples were given on how this synergy could work:

Weather predictions based on indigenous knowledge can be used alongside those from meteorological department. A case in point was the predictions given in one meeting in 2014, where local meteorologists and an elder gave their separate weather predictions. Apparently, the unfolding weather patterns in the year followed closely with those given by the elder.

In another incidence of pest attack on crops, government officials used all the chemicals they knew of to save crops from pests. This did not work, and the government officers were frustrated. One government official remembered the local custodian of sacred natural sites who leads in ritual practice at the local sacred site. He approached him secretly and committed to provide the materials needed for ritual. The ritual was done and the pests disappeared.

A key outcome of the meeting was an acknowledgement by all the groups that there is an urgent need for the different knowledge systems to work together. In moving forward, they agreed to keep exchanging ideas and information on the various priority subjects, as they clarify how the newfound collaboration will be made to work for people and territory.

Figure 8: A custodian makes a presentation during the cross-knowledge dialogue

Figure 9: A break-out session during the cross-knowledge dialogue

Establishment of a community learning centre

The community research group has been pursuing their mandate with much zeal. From their experience, they have advised the community that the most appropriate strategy for them to make good use of the knowledge and biological materials they are recuperating is to have a community learning centre, where the seeds recouped will be multiplied, new skills will be taught, important indigenous knowledge and cultural practices will be shared, and other innovative technologies developed. This is the space where the community envisages that he different knowledge systems will connect for joint analysis of challenges facing the community and developing action plans.

The community has decided to acquire land and set up the centre using their own resources, so that they can control the terms and intensity of engagements with other knowledge systems. They have formed an organization and started contributing money to purchase the land.

Reflections on eco-cultural calendars

- Eco-cultural calendars are a strong community research tool which can support a process to revive a whole socio-ecological system, as they embrace the whole "universe".
- Eco-cultural calendars are also essentially a community planning tool, which can be used to develop community ecological governance plans towards revival of socio-ecological systems
- Eco-cultural calendars are useful in bringing to the fore the important cross-gender collaboration as they show the different but complementary roles of men and women, boys and girls. The roles of either gender need be fulfilled for those of the other gender to be useful.