



Influencing regional policy processes in
Climate Change Adaptation through the interaction of
African pastoralist traditional knowledge and
meteorological science

A Contribution to the Nairobi Work Programme
on Impacts, Vulnerability and Adaptation



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**Report on Implementation of training on
Participatory 3D Modelling in
Baïbokoum, Logone Oriental, Chad**

31 July – 11 August 2012

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Funding for the Workshop was generously provided by
Technical Centre for Agricultural and Rural Cooperation (CTA).

IPACC extends its thanks to donors, communities, elders and partners.

1 PROJECT REPORT

1.1 Summary

The Indigenous Peoples of Africa Coordinating Committee (IPACC) is the pan-African advocacy network for indigenous peoples. Most of the 138 member organisations represent hunter-gatherer or pastoralist peoples in either humid equatorial forests, or African semi-arid and hyper-arid ecosystems. IPACC has participated in the UN Framework Convention on Climate Change since the 13th Conference of Parties in Bali, Indonesia in 2007.

IPACC is developing a regional approach to integrating the traditional knowledge of indigenous peoples in African national platforms on climate adaptation, including the National Adaptation Programmes of Action (NAPAs) and the National Adaptation Plans (NAPs). The aim is to create positive synergies between science and traditional knowledge, and to inform national policy making from the perspective of the realities of indigenous peoples lives, cultures and economies.

The 2011-2012 project, supported by the Technical Centre for Agricultural and Rural Cooperation (CTA) involved three distinct parts:

- a) conduct a regional African workshop in N'Djamena, Chad 7 – 9 November 2011 on indigenous pastoralists' traditional knowledge, meteorology and climate adaptation in cooperation with the Chadian government, World Meteorological Organisation, UNESCO and hosted by AFPAT. Report at: http://ipacc.org.za/uploads/docs/N%E2%80%99Djamena_Declaration_eng.pdf ;
- b) conduct a formal side events at the 17th Conference of Parties to the UN Framework Convention on Climate Change in Durban, South Africa from 28 November to 10 December 2011;
- c) conduct a training exercise in Participatory 3 Dimensional modelling in Baïbokoum, Logone Oriental Department, Chad, 1 – 11 August 2012.

This report focuses on the implementation of the third phase of the project, the participatory 3D modelling (P3DM) exercise in August 2012. The other two phases having been covered in previous reports, media and publications.

The Chadian host, Association des Femmes Peules Autochtones du Tchad (AFPAT), identified a site near the town of Baïbokoum, Logone Oriental in southern Chad. The Baïbokoum¹ landscape and context were ideal for P3DM training.

Overall, the P3DM was a success. Pastoralists from the region were engaged with the model and found it was a valuable platform for expressing their concerns about land use changes and marginalisation. Pastoralists, AFPAT and government all acknowledged how the mapping allowed issues of climate change and land use competition, including administrative decisions to become more transparent, with the opportunity to do conflict prevention work between farmers and herders. The map was completed, training was successful, participation was good, and the protocol day drew substantial media attention and the presence of high ranking officials, including the Governor of the Department, representatives of national ministries, the Prefect and Sub-Prefect for the Commune.

¹ The main village is called Baïbokoum, this is a Fulfulde word which in their language is written as M'Baïbokoum, it is also the name of the mountain adjacent to the village.

The P3DM mostly concentrated on issues of land use change and competition for access to water and land resources between expanding sedentary farmers and more marginalised pastoralists. The pastoralists were the former custodians and users of the Baïbokoum territory and now find themselves blocked off from traditional resources and access. The pastoralist participants concentrated on showing the current land usage (mostly agricultural near Baïbokoum, with wilder forest areas towards the border region), and at the same time showed their historic cattle migratory routes, which once linked pastoral tenure systems with water rights in the area.

Local leaders found the map demonstrated several points:

- i) a loss of rights by the pastoralists, attesting to their marginalisation;
- ii) a lack of mechanisms for talking about resource rights and preventing conflicts;
- iii) the evident problem that the farmers are destroying biodiversity, land is becoming exhausted from unsustainable soil use, and the marginalisation of traditional indigenous governance systems which would have protected forest cover and specific tree conservation.

Less attention was given to climate change impacts than was expected. In practice, the more urgent issues of land-use change were highlighted in the mapping. This is not surprising considering the changes in population density and the loss of land and water rights by the indigenous pastoralists. Still, all participants and government noted the surges in extreme weather events (both flooding and drought) changes in seasonal patterns and predictability. Baïbokoum, even though in a relatively humid part of Chad, suffers from water stress in the dry season. AFPAT indicated that it would like to do follow up work with sedentary, semi-

nomadic and nomadic community members to reflect further on the experiences of climate change in the territory.



One of the most important advocacy results was that the Governor of Logone Oriental Department, His Excellency Mahamat Zene Al Hadj Yaya, and the President of the 5% of Oil Extraction Revenue Investment Fund for southern Chad, Mr Berangoto Myaro both attended the closing protocol event. The Governor was sufficiently impressed by the P3DM that he has offered immediately to address the issue of water access and cattle migratory tracks (as represented on the map). The President of the 5% of revenues has resources and is interested in following up on the mapping. He is interested in helping to conserve the physical model, and using it for land management and planning with local communities, including addressing forest conservation, soil conservation, and should they be able to extend the mapping, it would be

applicable to the impacts of oil extraction to the east of the mapped territory.

1.2 Training and participation overview

The mapping was attended by over 60 M'bororo² semi-nomadic and fully nomadic pastoralists from the territory concerned. Originally the plan was to bring 90 people but the financial resources were exhausted before the full complement of villagers could participate. The 60 participants were however able to complete the coding of the map.

Training was provided by Mr Barthelemy Boika of the Réseau des Ressources Naturelles in the Democratic Republic of Congo (DRC). Training included the basics of cartography, an introduction to GPS use, and hands-on experience with building a 3D model using a 10m contour line map at a 1:10 000 scale.

There was some discussion about whether 1:10 000 was the best choice for the map. If 1:12 500 or 1:20 000 had been used, more of the nomadic land use pattern would have been visible, and the oil fields to the east would have been visible. Owing to the difficulty of communication between AFPAT, the GIS specialist and IPACC Secretariat, the 1:10 000 scale ended up as a default which was nonetheless useful. The inapplicability of the P3DM to the Lake Chad area, and the problem of showing a vast mobile land use system, still raises the question of whether IPACC should be supplementing the P3DM methodology with other methods to effectively engage in participatory modelling with nomadic pastoralists.

Trainees included indigenous pastoralists from Uganda, Kenya, Tanzania, Niger and Cameroon, as well as members of the AFPAT network in Chad. Resources were not available to bring pastoralists from Southern Africa or North Africa.

The core trainee group was comprised of:

	Men	Women
Chadian	11	7
Other African	5	4
Total	16	11

Trainees included a range of ages, with the Chadians coming from five distinct parts of the country with different ecosystem contexts. The full list of participants is given in Annexure 5 at the end of the report.

One Chadian journalist and the two Burkinabe film crew members participated throughout the training when available. IPACC Secretariat provided two staff members and one intern. IPACC provided training and management support for the project's implementation.

Trainees were introduced to the basics of cartography by Boika; this included an introduction to scales, 2 and 3 dimensions, latitude and longitude, altitudinal contour lines and geo-referencing. Training was done in French with interpreting into Fulfulde and English. The trainees then engaged in an exercise of building an ephemeral map of the compound where the training was located. Two groups took 45 minutes to study the compound, decide on codes and elements for representation, then worked collaboratively, one group in Fulfulde and one in a combination of English and French. There was a reflection on human cognition and 3D spatial representation.

²M'Bororo is the name in Fulfulde for herders who are part of a larger language group of people known as Fulani (in English), Peuls (in French) or Fulbe (in their own language). Fulfulde is the name of the language of the Fulbe. There are dialect variations between the different parts of Chad and with neighbouring Fulfulde speakers.

- Taught participants how to determine direction and orientation, using the direction of the sun rise and sun set to demarcate East and West
- There are conventional colours of maps
 - Blue for water
 - Red for roads and transit routes
- Additional things that an indigenous map may incorporate using local language
 - e.g. foot paths or cattle tracks may be more important to local people than the national highway
- GPS technologies were understood better when explained using Google maps and GPS systems present in cars and planes; shows permeation of these technologies in day to day life without full grasp of what is involved;
- You know you are working with pastoralists when participants ask if a GPS devise can be affixed to a cow.

Boika provided practical training of the use of GPS technology. Trainees enjoyed the GPS training and asked that in future they would like more exposure to the relationship between GPS and GIS / mapping.



Legend training was provided by Nigel Crawhall with facilitation by Aïssatou Oumarou of AFPAT. Three teams of trainees interviewed Fulfulde speaking elders to build the base legend, using points, lines and polygons. Some of the language from other parts of Chad proved to be irrelevant in the Baïbokoum landscape, though overall the base legend was quite thorough. Fulfulde speakers were interested in discussing the meanings of the terms. The map had relatively few points (compared to previous maps in Africa), relatively more lines, and a high proportion of polygons. Most of the attention in Fulfulde is placed on types of surface water access or well systems.

Two different types of rubber and foam were used to construct the scaled model. Once the rubber was glued down on the base model, nailed down and covered with glue and crepe paper, the unevenness of the surface ceased to be an issue, and in the end the model's structure was successful for the purpose. Owing to the high humidity and rainfall in the Baïbokoum area, it was a good idea to use foam rather than cardboard.

The model was built with the participation of local people, school age youth and adults. The team was led by a local tailor who was most helpful in the work. Some of the youth were too young to work with sharp implements but enjoyed learning about the model building. There was a level of small pilfering of materials which became a problem but did not stop the project. There was a crisis after the plumb line weight was stolen on the third day. A local imam helped encourage the perpetrator to return the weight discreetly the next day. This small crisis event helped the group feel more united around its project and highlighted community ownership of the model.

The first group of 30 villagers arrived on Tuesday 7 August. The orientation fell to one of the AFPAT members who did a good job, but it highlighted the vagueness of AFPAT's role in the management of that part of the process. Informant Group 1 from the community had a very positive response to the model and immediately started coding and working on the model. The AFPAT team were again unsure of their role, often doing the coding work rather than facilitating at the start of the group work. Once this was discussed with the trainers, this problem fell away and several of the AFPAT women and men emerged as excellent facilitators of the process.

There were fewer women than men attending from communities, but with AFPAT's female facilitators of different ages they were able to help the nomadic women take control of certain elements of the mapping and be fully involved.



AFPAT's facilitators noted that there were some tensions between village chiefs present in Group 1. Overtime, fascination with the model overcame historic issues and the chiefs agreed to cooperate and work together on the model. This was a practical example of how the landscape model helped create a shared space and platform.

The introduction of Group 2 was not so smooth. Again, there was a gap in the local management of the process and Group 2 reached the model without any facilitation. Some elders were angry that Group 1 had coded their villages and territory without consent. They also were slightly disoriented and thought there were mistakes. After this process was taken in hand, and a more formal introduction to the process and legend was done, Groups 2 and 1 ended up working together to finish the model.

One interesting component of the model was that of protected tree species. In the legend elicitation, Aïssatou Oumarou had mentioned the issue of 'navigational trees / *arbres de repères*'. There is no single word in Fulfulde for these trees, as they are known by their

species name. It was not anticipated that they would be shown by the herders, but in fact six different species were shown on the model, as individual trees or groves. All of the trees have medicinal functions and some have other ecosystem functions (e.g. sites of annual butterfly transformations). We were fortunate that Al Hadji Ahmat Baka, a local marabou (holy man) had studied botany and had an old publication on tree ethno-botany in Fulfulde from neighbouring Cameroon. With this, we were able to identify all six species on the map's legend. See Annexure 1 for the list of trees.

The end of the mapping had a few problems. There was not a final systematic review of the legend with the knowledge holders. As a result, a few elements which we know occur in the territory, such as *beellel*, a type of swamp, were not marked. Also the name tags for the villages were hard to read in places. The points, in particular, could have done with a more careful and systematic review before finalisation.

The whole exercise was run during the holy month of Ramadan. On the one hand this meant that trainees and villagers got tired as the days of fasting progressed. On the other hand, most of the international trainees were also Moslem and so there was a sense of shared culture, values and religion. People prayed together five times daily and this became a theme in the training. IPACC had already started to develop the theme of Islamic values in climate impact and adaptation. This was picked up in the media work and features in the documentary film – *Dangers in the bush, map of good faith*, by Souleymane Ouattara of Jade Productions. .

1.2.1 Media

The film media team had previously worked with AFPAT and IPACC. They knew many of the participants and fitted in easily with the work plan. They picked up the theme of conflict prevention and did site visits to villages and met with local committees dealing with farmer-herder relations. Jade Production's team also worked on the model itself. They liked the theme of Islamic values and how teachings of the Qur'an, so prominent during Ramadan, also give guidance on climate adaptation, vulnerability and impacts.

The overall impact of the media was substantial, and touched on all the key issues of climate, land use, and the rights of indigenous pastoralists to be involved in decision making.

1.3 Problem Statements

- African governments have not developed adequate national policy frameworks on Climate Change adaptation;
- Meteorological science and African pastoralists traditional knowledge of climate forecasting are neither shared nor integrated into current African national adaptation or related agricultural policy making;
- African climate negotiators have not incorporated a combined approach of Traditional Knowledge and meteorological delivery capacity into their negotiating positions at the UNFCCC & United Nations Convention on Biological Diversity (UNCBD) programmes of action;
- Pastoralist members of IPACC and West African organisations have not been exposed to PGIS / P3DM practice.



2 PROJECT DETAILS

2.1 Project Rationale

2.1.1 Overall Objective

The overall objective to which the project is meant to contribute is **safeguarding bio-cultural diversity, social and ecosystem resilience, and ensure food security in ACP countries.**

IPACC's intention is to use the experience, materials and outputs to develop a pledge to the Nairobi Work Programme to provide African state parties with resources on how to integrate traditional oral knowledge into their national adaptation plans and platforms.

2.1.2 Project Purpose

The Project Purpose is the following: **Local and indigenous spatial and biological knowledge are recognised by influential regional African bodies and made more authoritative in relation to meteorological forecasting and national adaptation policy making.**

This will be attained through the delivery of the following **Results:**

2.1.3 Project Results

Result 1:	Evidence is provided by pastoralists and meteorologists as to how different climate and natural resource predictive knowledge systems can be used synergistically in national adaptation policy making;
Result 2:	Awareness of regionally influential climate policy bodies is raised regarding the need and availability of participatory methods for integrating science and traditional knowledge in national adaptation policy processes and procedures;
Result 3:	Staff from Francophone African conservation and meteorological agencies, NGOs and indigenous activists are trained in P3DM in relation to pastoralist land use and adaptation as an example of participatory methodology in integrating traditional knowledge into adaptation policy making in Africa.

This part of the project focussed Result 3, providing training on P3DM. There was no national counterpart in the training, however three Sahelian-Saharan indigenous peoples' organisations received training and are interested in following up. The President of the 5% petroleum investment fund is particularly interested in how to use participatory mapping to move forward with resource planning and engaging with communities about land use and conservation. The film will need to be used effectively to raise awareness with national technical agencies. At the end of the mapping, the President of the 5% organised for Boika to meet with national experts in N'Djamena. During the Protocol day, there was also engagement by the Ministry of Livestock and the focal point on climate change for Chad.

Due to the issues of the location and the timing, there was not participation by international agencies, including WMO and UNESCO. IPACC and AFPAT are organising workshops of the outcomes with German development agencies present in Chad.

IPACC will present the results at a formal side event at COP 18 of the UNFCCC COP18 in Doha, Qatar, entitled Islamic values, traditional knowledge of pastoralists in dealing with climate impacts, vulnerability and adaptation in dryland areas. IUCN's Global Drylands Programme is a co-host of the event.

2.1.4 Activities and Inputs (physical, human and financial)

Activities to achieve Result 3: The third output will require the implementation of following activities:

- (i) Plan out a P3DM exercise in order to respect the rights and meet the expectations of the local communities, with appropriate governmental authorisation and engagement, ensuring capacity building of national and international ACP trainees from francophone countries;
- (ii) Support an African NGO to conduct a P3DM exercise in Bororo pastoralist area of Chad, including the production of additional audio-visual documentation;

The activities for Result 3 were achieved.

2.2 Project Beneficiaries

Direct beneficiaries: 60 pastoralist representatives the Baïbokoum area, plus 9 international indigenous trainees, plus 12 members of AFPAT's national team attended the P3DM. No staff from Francophone African conservation and meteorological agencies attended the mapping.

Indirect beneficiaries: The population of Logone Oriental, Chad have now had contact with participatory Geo-spatial planning methodologies with the top government officials for the Department attending the protocol event and expressing support for the methodology.

10,000,000 indigenous pastoralist peoples in West, East and Southern Africa should benefit indirectly from a higher political profile of the role of traditional pastoralist knowledge in climate adaptation.

2.3 Geographical Coverage

The P3DM exercise was held in Baïbokoum, Logone Oriental, Chad, the participants came from pastoralist communities in Kenya, Niger, Uganda, Tanzania and Cameroon. The selection of countries shifted during the project. Mboscuda, the national M'Bororo network of Cameroon asked to participate in the training. There was no funding for SADC delegates.

2.4 Implementing Agencies

- **AFPAT:** IPACC's national focal point and coordinator of the in-country events and regional lobbying strategy for IPACC. AFPAT organised the logistics for the Chad workshop and mapping on cooperation with the IPACC Secretariat and technical partners;
- **CTA:** Technical (P3DM / GIT facilitation and training); financial support to ensure local and international participation in the mapping, and PV resources and procurement of equipment and materials.
- **IPACC:** IPACC was the principal implementing agency, responsible for budgeting, project design, coordination of cooperation agencies, and logistical arrangements. IPACC was responsible for coordinating commitment, scheduling and financial involvement of partner organisations.

2.5 Co-funding arrangements and other contributions

IPACC's two core donors on environmental advocacy are Norwegian Church Aid (NCA) and Bread for the World. Both provided additional technical and financial support for the P3DM and the IPACC Secretariat costs.

2.6 Linkages with other project-related initiatives in the Region(s)

IPACC is working directly with the Africa Group's climate negotiators through contacts at Conservation South Africa and the South African Biodiversity Institute (SANBI) in Cape Town. A follow project is being designed in indigenous pastoralist areas of the Northern Cape Province of South Africa for 2013 – 2014.

IPACC's mitigation specialists have met with the Africa Group's full climate specialist group in Johannesburg in March 2011 and will continue to use this influence. In addition, AFPAT is in regular contact with AMCEN, the main inter-Ministerial process for defining climate and environmental regional positions. IPACC intends to expand this to focus on adaptation policy making, with a focus on the Least Developed Countries Expert Group headed by Uganda, and NEPAD's policy role in Africa.

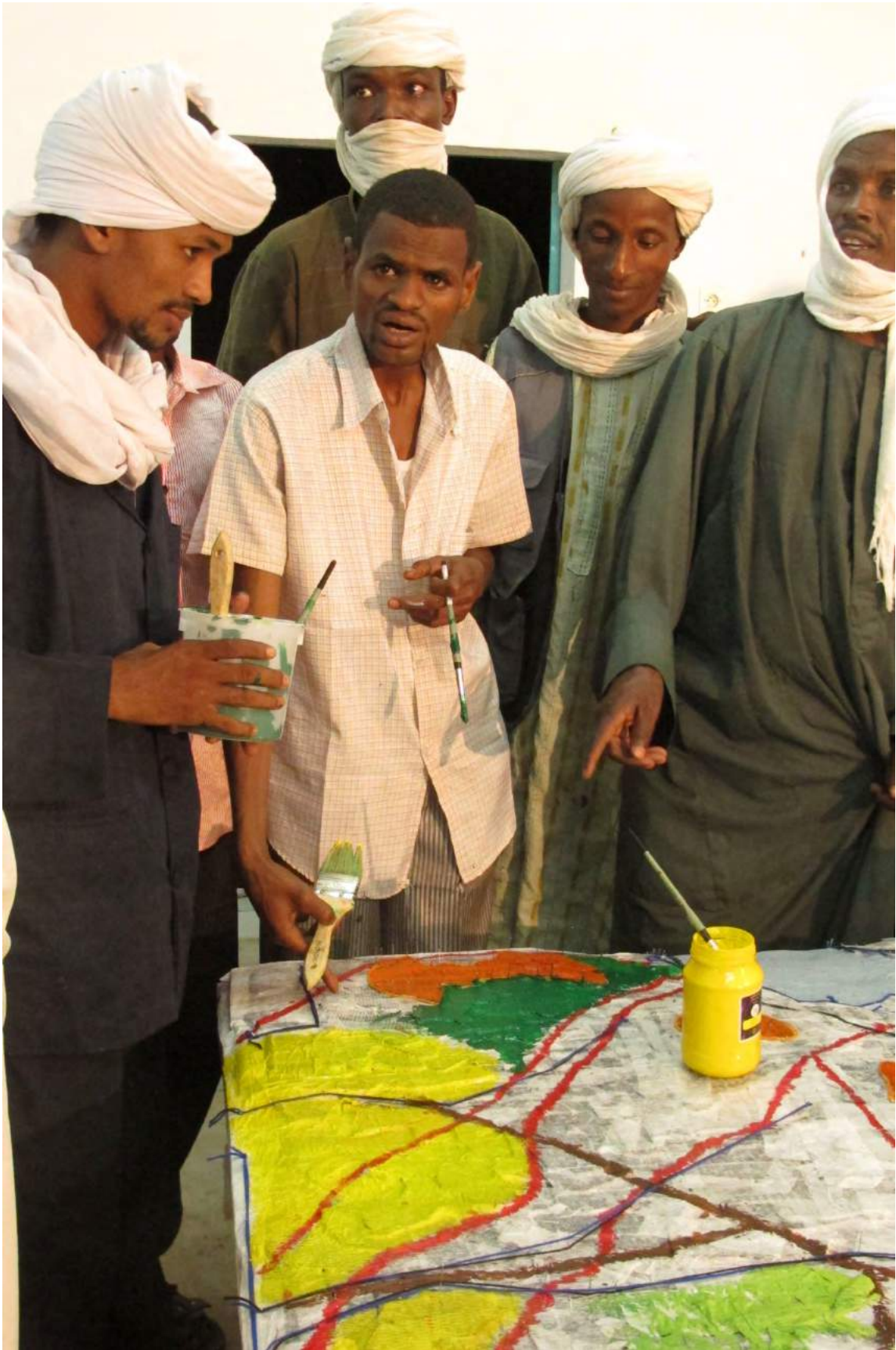
IPACC is working with the IUCN's Global Drylands Programme, the Southern African Faith Communities Environment Institute and IPACC members to present the results of the P3DM at a side event at COP18 of the UNFCCC in Doha, Qatar. IPACC is also sharing the results with the UNFCCC's Nairobi Work Programme.

2.7 Funding

Funds for the implementation of the Project were made available by CTA. Additional core funding is provided by IPACC's donors, Norwegian Church Aid and Bread for the World.

List of Acronyms

ACMAD	African Centre of Meteorological Applications for Development
AFPAT	Association des Femmes Peules Autochtones du Tchad
ECOSOC	UN Economic and Social Council
GEF	Global Environment Facility
ICT	Information Communication Technology
IPACC	Indigenous Peoples of Africa Co-ordinating Committee
LDCs	Least Developed Countries
NAPA	National Adaptation Programme of Action
P3DM	Participatory 3-Dimensional Modelling
PGIS	Participatory Geographic Information Systems
SBSTA	Subsidiary Body for Scientific and Technological Advice
TEK	Traditional Ecological Knowledge
UNCBD	United Nations Convention on Biological Diversity
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	UN Framework Convention on Climate Change
WMO	World Meteorological Organization



ANNEXURE1

ARBRES DE REPERES DANS LA ZONE DE M'BAÏBOKOUM

Dans la culture Fulbe (Peule), ces arbres ne doivent pas être coupés. Ils sont protégés en tant que source des médecines traditionnelles. Les arbres sont associés avec les génies dangereux. Les enfants ne doivent pas jouer sous un tel arbre, et c'est interdit de dormir sous un tel arbre. Le risque associé est relative à l'espèce des arbres. Les M'bororos sont inquiétés que les agriculteurs locaux brûlent les champs et détruisent ces arbres de repère qui ont une importance dans la navigation, la santé humaine et animale, et dans la culture.

Nom en fulfulde (nom local / nom au Cameroun)	(<i>nom latin</i>)
Ibbidebbi	<i>Ficus gnaphalocarpa</i>
Djabi	<i>Zizyphus jujuba</i>
Kohi	<i>Prosopis africana</i>
Naréhi	<i>Parkiafilicoidea</i>
Kayarlé / Kayerlahi	<i>Daniella oliveri</i>
Kobbahi	<i>Isoberliniadoka</i>
Zimpirehi / Tchekehibodehi	<i>Ficus iteophylla</i>
Kaladehi / Tchekehidanehi	<i>Ficus thonningii</i>

Source: Pierre Malzy, Maître de Recherches des Laboratoires des Services Agriculture Outre-mer, **Quelques plantes du Nord Cameroun et leurs utilisations.**

ANNEXURE 2

DEMOCRACY WALL

A CTA-inspired technique designed both to empower participants and to enhance communication between participants and organizers, the “democracy wall” consists of voluntary participant responses to four different prompts. The prompts are as follows:

- I feel that . . .
- I learned that . . .
- I noted that . . .
- I recommend that . . .

These prompts were displayed prominently on the walls of the workshop space, and participants were encouraged to contribute their thoughts often throughout the workshop. All observations were noted verbatim.

Actual Baïbokoum Democracy Wall contributions (translated into English)



I recommend that:

- The workshop start with a word of prayer;
- More attention should be given to the theory of cartography – this is a big need for us;
- National cartography technicians should be fully involved in the whole of the project;
- I recommend that trainees should learn how to work with GPS data – how to upload this into map software;
- Resource mapping should continue in East Africa, for example in Tanzania, Kenya and Uganda where there is a land crisis.

I felt that:

- We were always able to participate and follow;
- Combining people who speak different languages delays and slows the process;

- I am excited to work in groups and hope to learn many things;
- I feel that time changes;
- It feels like we are at school; we learned what we did not know;
- The facilitators were very good; attracting participation;
- GPS is well understood so far;
- Identifying the resources in the compound was practical [as a learning method];
- Even if we did not go to school, we can still understand this work;
- All what we did was participatory and we knew all of the compound area by the time we were done;
- I felt that the indigenous people became comfortable with the trainers;
- Excited to see how the map will be used by the community in the future;
- Team leaders are good at finding solutions to complex logistical problems, e.g. fixing problems caused by delays in getting the material to the venue;
- Resource mapping is critical in Africa where man-made poverty is covering an entire continent;
- It is interesting to see community members themselves identifying where the rivers, points and other information is on the map. This mapping should mitigate conflicts related to the land. If IPACC would have more funds to implement the same mapping project there, I think this mapping is an essential tool which helps indigenous pastoralists to defend their land and pastoralism as their legitimate livelihood system;
- I felt that to identify mines and oil well is very important because in the exploitation of this natural resources the pastoralists are always neglected and even evicted without compensation;
- The mapping can be used to resolve some outstanding issues – social, economic and political problems in our midst;
- We pray the government of Chad will recognise the people's map and together draw the way forward for implementation;

I noted that:

- 1:10 000 scale may not have been the best choice;
- Foam should have been sourced in-country – there are always problems with customs and airports;
- Things are explained in a way we can understand, even those of us who did not go to school can understand what we are being taught;
- We should have done a site visit with the project partners and technicians before starting the P3DM;
- The GPS training is important for us to understand navigation and the making of maps;
- Chadians are warm and welcoming people;
- I understand that we are all indigenous pastoralists in Africa and have common signs for land mapping and identifying our areas;
- No one is illiterate; the problem is a lack of effective consultation [by government and decision makers]. I learned that people can speak with the mapping;
- In the community's participation in the process of resource mapping they could identify the resources of their locality so easily using the map on the table; I thought earlier it will take a long time;
- I noted that there is good understanding between us, and that everyone is content to work together. We wish that the work continues in such a good way;

- I noted that amongst our participants, it was only men who participated and not so much the women; meanwhile we said the mapping must be participatory;
- I learnt from resource mapping that literate people and illiterate people are all the same; we are well informed to identify resources and most of the knowledge is contributed by the so-called *illiterate* pastoralists. So we challenge the word 'illiterate' in this context;
- People from the two different groups in the practical mapping of the compound exchanged ideas without even communicating with language;
- Everything that was done was through our participation;
- There was substantial mobilisation of the local communities, which impressed me (good participation);
- Linguistic barriers have no bearing on one's ability to work together;
- The map came up [out] very clearly;
- GPS positioning is interesting and helps us think in the world, but there is a built in error which I hate.

I learned that:

- Progress is easier when we work together and share the same objectives;
- Working in a group is more efficient;
- The practical, hands on method is a good approach to participatory mapping;
- Time is an important element in mapping i.e. There was a car present when we made the [ephemeral] map, but later there were three when the map was explained;
- How to trace and represent the surrounding environment as it is;
- How practical people were in identifying the resources in the compound
- How to plan for our resources;
- I learned how to trace and describe the environment as it is;
- How to draw a space/place
- Culture and language can be polygons;
- Indigenous peoples have a mastery of their environment and can contribute effectively to climate change mitigation and adaptation;
- Participatory 3D modelling enables communities to use the map in advocating for development and conflict resolution;
- We learned that a GPS can help guide someone who does not even know the territory;
- A GPS can help guide a person to a specific position [location];
- A community understands their area well;
- I learned a lot;
- I learned that handheld GPS's are not all the same [in terms of accuracy], but they have the same basic functions;
- I learned how a GPS can be used to help find the position of something;
- I learned about how to use a GPS;
- We learned that the GPS is helpful in guiding us;
- I understand a bit more, it is moving forward;
- We know how to plan for our [resource mapping] projects.

What was learned during the construction of your first legend?
(Participant Observations & Responses)

- How to differentiate points, lines, and polygons. The difference between point and polygon is dependent on scale
- Lines can be rivers, roads, but also transhumance routes or migration patterns
- The way that resources were noted at a macro, community level; a level which people understand and identify with.
- Languages develop in and are shaped by the landscape from which they emerge, which is why translation is discouraged—the Fulani language matches that which is being demarcated in the legend
- What was demarcated shows the priorities of the people making the map e.g. *Sa'ddoré* which means *savannah-land where trees grow*; has different behaviour in the rainy season than the dry season; water saturation levels determine whether or not it will be good grazing pasture. This one word does not have an English equivalent and therefore is a reflection of the landscape from which it emerged;
- Must factor in alternate meanings which can emerge from the same word;
- The link between language and the environment serves as a reminder of the importance of indigenous peoples' involvement in participatory mapping. i.e. Urban decision-makers will have limited grasp of region compared to population that lives there;
- Hunter-gatherers often have few lines except for the rivers; *"only hyenas and farmers go back and forth over the same line"*. Herders in Chad recognised the meaning of this statement by Kenyan hunters. Instead hunter-gatherers emphasize points; pastoralists seem to emphasise lines and farmers use many polygons;
- On our map lines and polygons are most popular, showing that as pastoralists we value large open spaces and movement;
- Interesting also to note that the majority of polygons are focused on water and water sources;
- Participant observation: we have included many things which are far too detailed for the general map. The details are important; yet it is something that government officials without inside knowledge would never know if they were to map the region.
- Question: how would you factor in future projections? i.e. A planned for railway line or anticipated desertification/flooding due to climate change
- This mapping is about showing our use of the land and using it in advocacy. Demarcating and explaining our use of the land is the base of our power.
- Understanding the connection between resources is also important; e.g. there is no point in declaring an area as being good grazing land if there is no water source close by
- Important info is left out of standard government maps. i.e. the reliability of a water source (permanent, temporary, seasonal, surface, underground, clean, polluted, swampy etc.). Pastoralists need to convey that pastoralism is a system not randomized movement
- Tension emerging here is over the use of water; the government has begun to co-opt the most water-rich areas and plant rice there, a process which will deny transhumant pastoralists access to water sources they rely on
- Think of who can contribute to your legend to expand the expertise. I.e. Women, elders, pastoralists, oasis-dwellers, teachers. Diversified and increased participation can build a more complete legend.

ANNEXURE 3

M'BORORO LEGEND MAKING

The following initial legend items were developed by three working groups with local informants. There were two implosive consonants which could not be shown in the GIS legend font, and ingressive 'b' and an ingressive 'd'.

Points:

- *Seboré*: source / spring (stagnant, not flowing)
- *Laïngél*: petit point d'eau permanent / small permanent water source
- *Laïngoum* : encore plus petit point d'eau temporaire / even smaller (temporary) water source
- *Waourou* : puit < 2m de profondeur / well < 2m deep (shallow)
- *Poundou*: puit > 10m de profondeur / well > 10m deep
- *Woïndou* : puit > 40m de profondeur / well > 40m deep
- *Soudou* : maison / house
- *Tchi'oum*: case, homon / very small house, hutch, birdhouse
- *Hirsirdé*: les abattoirs/ slaughterhouse
- *BabalNamugo (Massin) Namirda*: Moulin / site where grinding, crushing, or foot-stomping of grains happens
- *Waldé*: enclose pour les animaux / kraal, enclosure for animal
- *Boulli*: pétrole (champ des puits de pétrole) / oilfields
- *Gassdé* : trou, mine / hole, pit, or mine
- *Hourfinirde / Miltinerdé* : lieu où les animaux font leurs cures salées / salt-licks
- *Le'dé* : arbre / tree
- *Arbres D'Orientation* : protégées ou dangereuses, identifiées par espèces / protected or dangerous trees which are species specific (see additional information in the Annexure)

Lines:

- *Bourtol*: route de migration / migratory route
- *Bouwol / Bouwagol* : route bitumé / paved road, cars use it
- *Lawel / Bouel / Bourtel* : route de campagne aux champs ; petites rouelles / country road to fields
- *Bourti* : route de pâturage / grazing route, cattle corridor
- *Dégorlé* : route d'abrévation / route to water source
- *Mayo* : grande fleuve / major river
- *Mayel* : rivière / smaller river
- *Tchelol* : bras de fleuve / tributary river
- *Ilaagol* : ruisseau, marigo / stream, swampy water course

Polygons:

- *Siirey*: une ville / a city or town
- *Tchi'el*: un village / a village
- *Lumo*: marché / market
- *Géssé*: champs des céréales / field of cereal crops ie. Millet
- *Babal Marorl*: rizières / rice fields

- *Sabéré*: land which has been depleted and is left to regenerate before being reclaimed by pastoralists
- *Goubé*: lieu où les arbousses repoussent / area where small shrubs are growing back after a drought or land-clearing; usually quite dense
- *Fitorou (Soukkoundé)*: forêt dense/dense forest
- *Lainde* : jungle inondable permanente/ forest that floods (is permanent)
- *Ha'daade*: aires protégées traditionnelles et modernes/ protected areas where grazing is forbidden, both traditional and modern; a system of wildlife conservation and controlled grazing similar to modern protected areas; traditionally declared as such by the chief
- *Wendou*: lac / lake
- *Yairé*: là où il y a de sol inondé après les crues des fleuves / open grasslands with flooding from the river
- *Tchoofol* : marécage permanent à côté de fleuve (dans le yaïré (savanne galée) / permanent wetlands next to the river (in the yaïré)
- *Louggol* : un grand marécage de saison (pas permanent) / a large seasonal wetland (not permanent)
- *Belel* : petit marre dans la saison / small seasonal wetland
- *Sa'boré*: sol périodiquement inondé / land that is seasonally flooded and does not soak up surface water –like *Yairé* but small and far from the river
- *Dyoldé*: terrain sablonneux / sandy soil area- can include dunes
- *Laddé*: un clairière (savanne) (la brousse où il n'y a pas des maisons) / savannah clearing without human settlements
- *Hoséré* : montagnes / mountains
- *Tapare* : colline / hill
- *Hardé* : terres sèches et dures – habitées par les génies / hard, dry land, occupied by djinns



Interesting notes arising from the legend

- Much distinction made between permanent and temporary, and between types of terrain (swamp, forest, grasslands, sandy, fertile or not, arable or not)
- Strong focus on water (river, water sources, floods, access to, profundity, artificial or natural, flowing or stagnant)
- Lines and polygons emphasized (movement and spaces)

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