

Draft Report

INDIGENOUS PEOPLES AND CLIMATE CHANGE IN AFRICA: Traditional Knowledge and Adaptation Strategies



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Charapa Consult 

**THE RAINFOREST
FOUNDATION**
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Mainyoito Pastoralist Integrated
Development Organization
*For Human Rights & Empowerment
of Marginalized Pastoralist Communities*



LEGAL ASSISTANCE CENTRE

Acknowledgements

This report describes the situation of some of the most marginalized and yet resourceful peoples on the planet; the indigenous peoples of Africa who are directly dependent on their access to land and natural resources and who, to some extent conserve their traditional knowledge and practices in the face of extreme marginalization, poverty and discrimination. Now, their vulnerability is further aggravated by the impacts of climate change and the legal and policy-related restrictions imposed on their adaptation strategies.

The researchers are grateful to the Topnaar and Hai||om communities in Namibia, the Ogiek, Maasai and Turkana communities in Kenya and the Babongo and Bayaka/Baka communities in the Republic of Congo who participated in the research and shared their knowledge and experiences, although the concept of 'global climate change' is alien to them and has little resonance with their experiences of interaction with local eco-systems.

The research has documented but not changed the desperate situation of these communities. However, we hope the conclusions and recommendations may eventually reach decision-makers and contribute to the necessary changes in terms of human respect, legal recognition and policy focus. Only then, would the research become relevant to the communities who participated.

This report is the result of collaborative efforts among all the partners; in particular Legal Assistance Centre (LAC), Mainyoto Pastoralist Integrated Organization (MPIDO) and Rainforest Foundation UK (RFUK), responsible for research in Namibia, Kenya and the Republic of Congo, respectively. Charapa Consult undertook the overall coordination of the research.

The present regional report builds on country-specific reports elaborated by LAC, MPIDO and RFUK. The report is edited by Birgitte Feiring and Sille Stidsen of Charapa Consult.

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List of abbreviations

ACHPR	African Commission on Human and Peoples Rights
ADDPA	Association pour la défense des droits des peuples autochtones
ALRMP	Arid Lands Resource Management Project
ASAL	Arid and semi-arid land
CBOs	Community-Based Organizations
CEPAD	Center for Pastoralist Development
FGDH	Forum pour la Gouvernance et les Droits de l'Homme
FoLT	Friends of Lake Turkana
FPIC	Free, Prior and Informed Consent
GDP	Gross Domestic Product
INP	Indigenous Natural Products
IPCC	Intergovernmental Panel on Climate Change
IPNSCCC	Indigenous Peoples National Steering Committee on Climate Change
KMD	Kenya Meteorological Department
LAC	Legal Assistance Center
MLP	Ministry of Land and Resettlement
MPIDO	Mainyoito Pastoralist Integrated Organization
NamWater	Namibian Water Supply
NDC	Namibian Development Corporation
NIPSCCC	National Indigenous Peoples' Steering Committee on Climate Change
OPDP	Ogiek Peoples Development Programme
PPA	Participatory Poverty Assessments
PND	Plan National de Development
RFUK	Rainforest Foundation UK
R-PP	REDD Readiness Preparation Proposal
TFESSD	Fund for Environmentally and Socially Sustainable Development
UNDP	United Nations Development Program

UNDRIP

UN Declaration on the Rights of Indigenous Peoples

UNFCCC

UN Framework Convention on Climate Change

Introduction

1.1. Study background

In January 2012, the World Bank Trust Fund for Environmentally and Socially Sustainable Development (TFESSD) commissioned Charapa Consult and partners to undertake a regional research project on Indigenous Peoples and Climate Change in Africa. In parallel, TFESSD commissioned similar regional studies for Asia and Latin-America. The initiative is underpinned by three major considerations. First, is the acknowledgement that although indigenous peoples have contributed the least to increased greenhouse gas emissions, they stand to suffer considerably from the impact of climate change, given that their livelihoods are directly dependent on natural resources and ecosystems integrity. Secondly, it is recognized that indigenous peoples have lived with climate variability for ages and have over time developed traditional knowledge and strategies for adapting to changing habitat and resource conditions, which have the potential to contribute to the design of appropriate frameworks for addressing the impacts of climate change. Finally, it is noted with concern that indigenous peoples have not been fully and effectively engaged in climate change dialogue at local, national and global levels, thus denying them the possibility of contributing to the search for solutions.

The initiative aims, through participatory research, to enhance the understanding of the relationships between climate change and indigenous peoples in order to inform climate change policy and assist local communities adapt to climate change. The research addresses three ecological sub-regions of the African region:

- Tropical forest zone of the Congo Basin (case studies in the Republic of Congo);
- Arid/desert areas in Southern Africa (case studies in Namibia), and;
- Lakes and wetlands in Eastern Africa (case studies in Kenya)

The research has been undertaken in a collaborative manner between Charapa Consult (overall coordination) and the following implementing partners:

- Legal Assistance Center (LAC), coordinating research undertaken in Namibia with the Topnaar and the Hai||om communities;
- Mainyoto Pastoralist Integrated Organization (MPIDO), coordinating research undertaken in Kenya in partnership with three community-based organizations (CBOs), namely the Centre for Pastoral Development (CEPAD), the Ogiek Peoples Development Programme (OPDP) and the Friends of Lake Turkana (FoLT) conducting the studies of the Maasai in Narok North, the Ogiek in the Mau Forest complex and the Turkana in Turkana Central. Further, the research in Kenya was supported by the National Indigenous Peoples' Steering Committee on Climate Change (NIPSCCC).
- Rainforest Foundation UK (RFUK), coordinating research undertaken in the Republic of Congo (Brazzaville) with Babongo and Bayaka/Baka communities, in collaboration with Forum pour la Gouvernance et les Droits de l'Homme (FGDH), the Association pour la défense des droits des peuples autochtones (ADDPA), and Association BaAka.

The research initiative has 3 specific objectives:

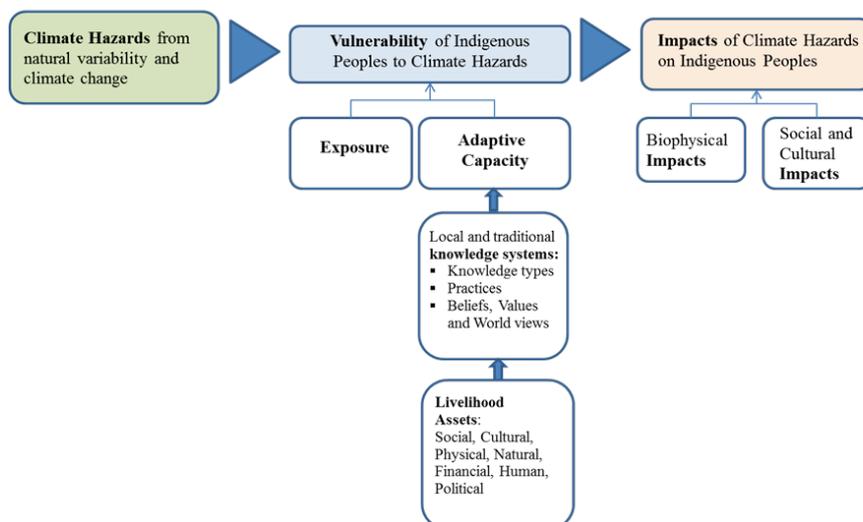
- 1) Analyze and document how indigenous peoples are affected by climate change;
- 2) Identify indigenous peoples' local and traditional knowledge, practices and adaptation strategies that are critical to minimizing the adverse impacts of climate change; and
- 3) Support strengthening of indigenous peoples' capacities for their engagement and direct participation in the formulation of national and international public policies regarding climate change.

The present regional report is the main composite result of these concerted efforts. Other products elaborated under the project comprise a Technical Report (literature review), a Case Study Plan (methodology and work planning), individual Case Study Reports from Congo, Kenya and Namibia as well as a brief summary report. All of these reports are available at www.charapa.dk/cc-adaptation

1.2. Conceptual framework

The ambition from the outset was to ensure that the research processes in Africa, Asia and Latin America would, to the extent possible, allow for comparisons across communities and countries. Therefore, the research, in terms of methodology and focus, should depart from a common conceptual framework. Based on consultations and discussions among the partners, the following framework was agreed:

Figure 1: Vulnerability and Impacts of Climate Hazards on Indigenous Peoples



The framework sees impact of climate hazards on indigenous peoples as a function of their vulnerability – which again is understood as a function of exposure and adaptive capacity. Adaptive capacity is understood as a complex of the social, cultural, physical, natural, financial, human and political assets of the concerned indigenous peoples, mediated through their local and traditional knowledge systems. Further, it was agreed among the partners that the local and national vulnerability and opportunity context would be thoroughly analyzed, in order to identify enabling or limiting factors related to indigenous peoples’ adaptive capacity. The research methodology was carefully designed on the basis of this conceptual framework.

The framework analytically distinguishes between the impact of climate change hazards and the conditions established by the vulnerability and opportunity context in which indigenous communities live and operate. However, most partners found it difficult in practice to separate climate change related impacts from other

factors such as governance, access to land, and socio-economic status, which are interrelated and have cumulative impact on the livelihoods and adaptive strategies of the indigenous peoples. For example, LAC reports that in Namibia, due to the limitations in access to land and natural resources, the direct impacts of climate change seem to be minimal compared to other threats. This challenge also has methodological implications, as, for example, LAC reports that in the communities “people are more eager to talk about their current problems (e.g. extreme poverty) instead of climate change”. Thus, as a remedial measure, LAC had to find a compromise between the research schedule and the participants’ needs. At a more profound level, many indigenous communities may find discussions about climate change impact marginal to the immediate legal, political and social challenges they are facing.

In Kenya, communities expressed that **research, which does not immediately address the serious challenges that communities face, is not very popular**. In many instances, it was evident that communities expect solutions to their immediate needs associated, for instance, with provision of basic services. This was also linked to research fatigue in some communities where similar research had been conducted in the recent past with respondents feeling that nothing had changed on the ground. Moreover, time spent in interviews reduced the time available for respondents to work in their fields and on other livelihood supporting activities, with some respondents clearly expecting some form of compensation for their time.

This picture is somewhat different in the pastoralist communities in Kenya, whose primary livelihood is extremely vulnerable to climate change; where climate-related hazards have already had catastrophic effects and thus been broadly recognized and discussed, and; where representative organizations of indigenous have struggled for participation in decision-making concerning climate change mitigation and adaptation.

1.3. Methodology

In order to ensure an adequate and coherent methodological approach, the implementing partners met at a planning meeting in Nairobi 30-31 January 2012. At the meeting, two main issues were emphasised:

- The need to ensure indigenous peoples’ ownership of the research in order to ensure that indigenous peoples and their allies can use the study as an advocacy tool for implementation of the recommendations, although resources for that purpose were not available within the budget, and;
- The need to ensure flexibility in the methodology and approach, in order to take into account the specificities of the diverse contexts, the organisational set-up of the various partnerships and the diverse needs and aspirations of the indigenous communities involved.

The main elements of the research were literature review; field research and, finally; analysis and field validation. Literature reviews were undertaken by the implementing partners on the national and local vulnerability and opportunity context, supplemented by a review of climate change phenomena in the eco-region undertaken by Charapa Consult.

The partners agreed on general principles for the research:

Adherence to international standards on indigenous peoples’ rights, in particular provisions of the UN Declaration on the Rights of Indigenous Peoples (UNDRIP) regarding participation, consultation and free, prior informed consent (FPIC).

Taking the diversity of indigenous communities into account and particularly paying attention to age and gender issues.

Enhancing ownership and policy impact to optimize the possibilities for the research to feed into the communities’ dialogue with relevant local authorities or contribute to their own management plans and strategies.

Capturing the dynamics of change and the related dynamic adaptation strategies of indigenous communities in culturally appropriate ways, comparing *how it was*, *how it is* and *how you think it will be* in the future illustrating change over a span of approximately 35 years.

Correlating information from diverse methods to see complex causalities, connections, trends and patterns. Hence, each village, household and individual should be identifiable in each data gathering exercise.

Focus of the literature review:	
Eco-region climate change phenomena	Trends Shocks Variability/seasonality Predictability
National and Local Vulnerability & Opportunity Context	Climate change impact: scale, intensity, predictability ; social, economic, physical and natural impact Contributing factors: Governance: legislation, policies, institutions, recognition of IP rights, conflict Socio-economics: poverty, health, education, demographics, migration patterns Environment: land and natural resources, climate change policies and programs Culture and ethnography: history, social organization, livelihood, cultural institutions

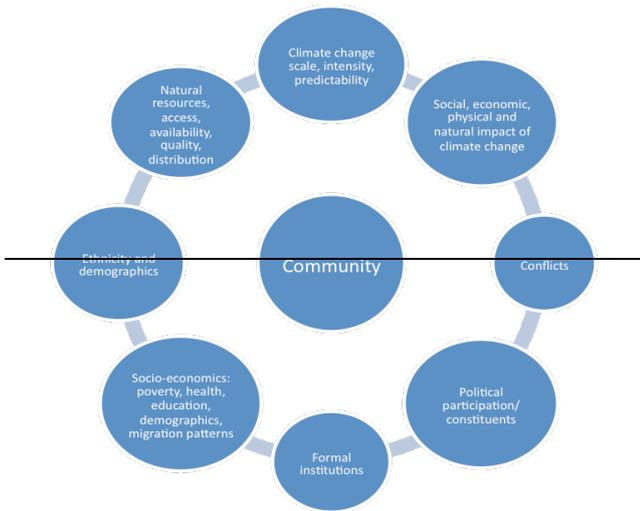
Obtaining the free, prior and informed consent of the communities was the first step of the field work. In Kenya, the Indigenous Peoples National Steering Committee on Climate Change (IPNSCCC) provided the national framework for mobilization of indigenous peoples and will use the study for advocacy at the national level. It was agreed that the consent of the communities should be obtained prior to the commencement of the field research on the basis of full disclosure of the purpose of the study and its implications. However, in some sites, prior consultations had not been done sufficiently and information had been provided to leaders but not to ordinary community members who were the target respondents. Consequently, the researcher then had to explain the research to the community and ask for consent at the commencement of the field work. Partnership with CBOs ensured the right contacts with appropriate elders and institutions and served to identify appropriate members of the respective communities to work as enumerators and assist in collecting data. Being themselves members of the respective communities ensured that they were able to use culturally appropriate methods to generate data, including using local languages. Sufficient time was allowed for the field work to ensure effective engagement, and to engage members of the communities in analyzing the situation and making recommendations. Each team of enumerators consisted of a man and a woman, and in each community, every effort was made to ensure the active participation of different social groups, including women, youth and the elders, who provided significant historical insight on local temporal dynamics of climate change.

The field work was undertaken in two rounds, with preliminary data analysis in-between. For the field work, a comprehensive “Methodological Manual” was elaborated by the partners, in order to ensure a common platform for data-gathering, while also ensuring the necessary flexibility for the partners working in highly diverse and complex contexts. RFUK further translated the manual into French, for use by partners in the Republic of Congo.

The field research comprised a series of data gathering exercises, including focus group discussions, review of locally available maps, data and statistics, compilation of lists of households and household members, elaboration of trend lines concerning local climate, environmental and natural resources, economic, social and institutional patterns, ranking of livelihood strategies, mapping of natural and physical assets, elaboration of seasonal calendars, transect walks, mapping of well-being, knowledge and political assets, scenario workshops, semi-structured interviews and registration of life stories. In addition, it was

stipulated by the TFSSD that a detailed survey questionnaire should be developed by the global project team and refined by regional teams to fit with sub-regional conditions, customs, practice, etc. The field work aimed at capturing the following aspects of the local vulnerability and opportunity context:

Figure 2: Vulnerability and opportunity context



In the course of implementation, the partners found that some exercises, such as the well-being ranking exercise, were not fully adapted to the targeted population and demanded efforts from community members, which significantly reduce their interest and participation. Partners therefore opted for simplifying a number of the exercises.

The questionnaire requires a special mentioning; a first outline, based on a sample questionnaire indicated by the World Bank, was discussed and rejected by the implementing partners who expressed scepticism about the usefulness and the appropriateness of a uniform, comprehensive and quantifiable questionnaire, based on pre-determined categories. Partners emphasised the need to simplify the questionnaire and to focus on more analytical and qualitative aspects through better suited methodologies such as focus group discussions, semi-structured interviews, ranking exercises etc. It was emphasized that in some communities collective information gathering exercises give better results than individual questionnaires. Following the discussions in Nairobi, LAC undertook a field testing of the draft questionnaire with the Topnaar community in Namibia, which strongly opposed the use of a questionnaire, which was considered culturally inappropriate and unnecessarily time-consuming. Finally, it was decided to work with a common questionnaire, which was considerably reduced in terms of length and complexity in order to gather basic information about main livelihood elements as well as perceptions of change related to these elements. In Kenya, the partners opted for a more comprehensive questionnaire, in combination with participatory methods and organisation of validation workshops with individual communities and at national level.

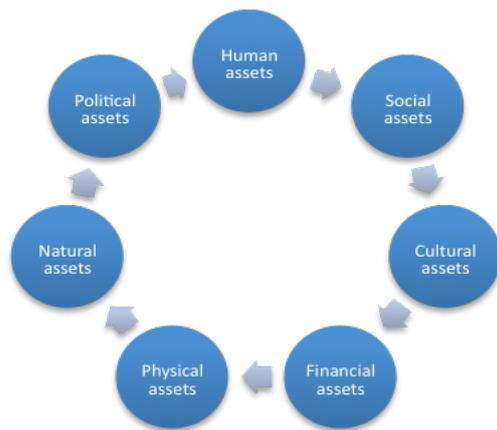
The methodology aimed at capturing the following constituting elements of indigenous peoples' adaptation strategies – and the linkages between these:

Figure 3: Constituting elements of indigenous peoples' adaptation strategies

No concept of climate change

One of the challenges felt by both RFUK and LAC was that the target communities in **Namibia and Congo** had no prior knowledge or understanding of the concept of climate change. Methodologically, both LAC and RFUK chose to focus on 'environmental changes' which were later analysed in order to identify those that link to climate change.

Although the methodology did not presuppose that communities had a concept of "climate" or "climate change", it became clear, during field work that communities may identify fundamentally different causal relations, which may have profound implications for their coping and adaptation strategies, and, by extension, for their interest in climate change research and engagement with related policies and processes. For example, the **Topnaar** community responded that their main coping strategy vis-à-vis flooding is to "pray every day and night". In **Boucy-Boucy**, when asked to imagine the rains not coming and the river drying up, individuals influenced by Christian churches said, "It only rains because God wills it. God would not allow this to happen".



It was agreed from the outset that partners would work with very different sampling sizes, due to the differences in the targeted communities, including some relatively small communities, with a limited number of households and a relatively mobile lifestyle. In spite of the differences, all surveys applied a similar sampling strategy, to ensure that all relevant social segments, as related to age, gender, knowledge and well-being, were covered.

All implementing partners faced challenges during the field work. Some of the major challenges faced by MPIDO in Kenya include:

Partnership challenges; arising from the commitment to conduct the case studies in partnership with local CBOs and to effectively involve the communities through free, prior and informed consent. This meant that the process at the community level was ultimately subject to the dynamics of the relations between the local partner organization and the community and the efficiency of CBOs was ultimately determined by internal institutional dynamics. An additional challenge related to the capacity of enumerators. In some communities, there is a limited inventory of capable people, who are often otherwise engaged or live outside the community. A key lesson is that such studies require provision of adequate resources and time to involve key technical personnel in the preliminary work, including the selection of enumerators. Where appropriately qualified and experienced enumerators cannot be found, there should be adequate time for the training of those. **Challenges about field work resources** were reported by enumerators in all the research sites, which involved traveling long distances over rough terrain. No provision was made for transport between households, most of which are widely distributed across the same rough terrain, with enumerators complaining of having to cover some costs from their remuneration, with obvious implications on their motivation. **Challenges associated with unpredictable weather patterns** are a common feature of research the case study areas, and in Turkana torrential rains interrupted work, increasing the time and cost needed to cover the designated areas. **Respondents tend to understate their possessions** especially livestock, in part because it is not in the culture of pastoral communities to enumerate their livestock, but also because of experiences with baseline surveys conducted by development organizations in which it is well understood that being identified as a poor person will attract assistance. These and other challenges were overcome mainly because of the local knowledge of enumerators, their rapport with members of the three communities and the commitment they exhibited in the conduct of the case studies. The community validation workshops held at the end of the second phase of the field work also provided a useful opportunity for filling in the gaps where these existed. As a result, the challenges have not had any adverse impact on the findings and conclusions of the case studies.

LAC undertook the survey in 66 households in 2 communities, MPIDO in 274 households in 3 communities and RFUK in 52 households in 2 communities. Charapa Consult developed the data entry sheets while the data entry was done by implementing partners at national level and later transferred to SPSS by Charapa Consult. A joint validation effort was undertaken based on initial data analysis. Cross tabulations were supplied by Charapa Consult to implementing partners to support qualitative analyses. In general, some of the methodological constraints lead back to the limited time and financial resources available, which did not allow for longer-term collection of qualitative field data, e.g. by applying more anthropological field research methods. Further, the limited time and resources posed a challenge in terms of generating genuine ownership of the research among the partners and communities.

2. Climate hazards and impacts in the African region

2.1. Scale, intensity and predictability of climate change in Africa

The climate projections from the 2007 IPCC Climate Change Assessment Report still presents the most comprehensive projections available. In its Fourth Assessment Report (2007), the Intergovernmental Panel on Climate Change (IPCC) strongly stressed the vulnerability of Africa, giving these general predictions for the future impacts of climate change on the continent: “Africa is one of the most vulnerable continents to climate change and climate variability, a situation aggravated by the interaction of ‘multiple stresses’, occurring at various levels, and low adaptive capacity (high confidence)” (Boko et al 2007, p. 435).

What is climate change?

According to UNFCCC (article 1.2), climate change is an adjustment of climate, which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is, in addition to natural variability, observed over comparable time scales.

The climate of Africa is warmer than it was 100 years ago. Observational records show that during the 20th century, the continent of Africa has been warming at a rate of about 0.05°C per decade (Hulme et al., 2001). By 2000, the five warmest years in Africa had all occurred since 1988, with 1988 and 1995 being the two warmest years. Model-based predictions of future climate change for the continent clearly suggest that this warming will continue and, in most scenarios, accelerate (Hulme et al., 2001; Christensen et al., 2007). For Africa, IPCC projections up to 2099 (Working Group I: *The Physical Science Basis*) indicate that “smaller values of projected warming, near 3°C, are found in equatorial and coastal areas and larger values, above 4°C, in the Western Sahara” (IPCC, 2007, section 11.2.3.1.). The basic pattern of projected warming has been robust to changes in models since the IPCC 2001 assessment (ibid).

Further, drought has spread and intensified since the 1970s, and the Sahel and southern Africa have already become drier during the 20th century. Forests, grasslands and other natural ecosystems are already changing, particularly in southern Africa. By the 2080s, the amounts of arid and semi-arid land in Africa will likely increase by 5-8 per cent (Boko et al 2007, p. 435 drawing on Christensen et al 2007). This is further documented by Williams and Kniveton (2011)

While there is now higher confidence in projected patterns of warming and sea-level rise and climate models agree on increased drought for Africa in the 21st century, there is less confidence in projections of regional patterns of rainfall over large areas of Africa (Thornton et al., 2008; Giannini et al 2008). Hulme et al. (2001) illustrate the large regional differences that exist in rainfall variability. Several studies have furthermore pointed out that different regions will be differently affected, with some areas experiencing

increasing overall rainfall, and others less (Stern, 2006). In summary, the IPCC 2007 assessment report (section 9.ES) concludes that there is very high confidence that “Climate change will aggravate the water stress currently faced by some countries, while some countries that currently do not experience water stress will become at risk of water stress.

Low predictability

An alarming finding from the IPCC 2007 report on Africa is that there is no agreement between the models – as both increases and decreases in rainfall are projected (Giannini, 2010). Thus, the lack of agreement between climate models in some regions reveals differences in predictability and gaps in knowledge of basic climatology (Wilby, 2007). Predicting the nature of climate change in individual countries and locations is notoriously difficult and even at regional scale, the possible impacts of increasing temperatures, rainfall variability, as well as changes in mean rainfall and hydrological processes are most uncertain. In fact, increasing unpredictability of rainfall, drought and flooding patterns seems to be a key characteristic of climatic change on the continent (Brown & Crawford 2009).

Williams and Kniveton (2011) argue that, despite the particularly high vulnerability of Africa to climate change and variability, there still remain large knowledge gaps on the manifestations of future climate change and variability for the region and the associated negative impacts of climate change. They point to two main reasons – lack of reliable data and lack of scientific climate expertise and cite Washington et al (2004, 2006) for Africa having the worst climate observing system of any continent.

Increasing levels of uncertainty make decision-making more difficult. Unforeseen impacts and lack of predictability have severe impacts, not only for immediately evident consequences such as food security, access to water, grazing land etc. but also for social structures, trust, authority and social and cultural cohesion.

A major impact of climate change in sub-Saharan Africa is its adverse effects upon the natural resource base (Kurukulasuriya and Mendelson, 2006) and countries in this region of Africa are expected to be hit earliest and hardest (IPCC, 2007) because their environments are closely linked with climate, and the livelihoods of its inhabitants are largely dependent on the utilization of land-based resources (soils and forests) as well as on freshwater, lacustrine and riverine systems as sources of potable water, fish and transport.

As a result of this dependency and widespread poverty, the communities in sub-Saharan Africa are particularly vulnerable to the effects and impacts of climate change and are likely to be adversely affected in terms of food security, sustainable water supply and by extreme climate and severe weather phenomena such as floods, droughts and desertification.

IPCC states that the vulnerability to climate change and climate variability in Africa is aggravated by endemic poverty, weak institutions, and complex disasters and conflicts. In this sense, climate change has a multiplier effect on risks, and due to its potentially disastrous effects and its scope, it fundamentally alters the socioeconomic environment of developing countries (Nkodia, 2011).

Effect on agriculture and food security

In terms of vulnerability, IPCC summarizes that “agricultural production and food security (including access to food) in many African countries and regions are likely to be severely compromised by climate change and climate variability (high confidence)... climate change will be likely to reduce the length of growing season as well as force large regions of marginal agriculture out of production. Projected reductions in yield in some countries could be as much as 50% by 2020, and crop net revenues could fall by as much as 90% by 2100, with small-scale farmers being the most affected...” (Boko et al 2007, p. 435).

2.2. Predicted climate change in the Congo Basin

The Congo Basin region has received little attention from the international climate change community and little documentation exists, even less for individual countries of the region (Bouka Biona and Mpounza, 2009). The IPCC 2007 Assessment Report notes that: "In the tropical rain-forest zone, declines in mean annual precipitation of around 4% in West Africa, 3% in North Congo and 2% in South Congo for the period 1960 to 1998 have been noted (e.g. Malhi and Wright, 2004)", (Boko et al., IPCC, 2007, p. 436).

Bouka Biona and Mpounza (2009) depict the increase in maximum and minimum temperatures in the Republic of Congo from 1950 to 2000:

Figure 4: Temperature trends in Republic of Congo from 1950 to 2000 (Source: Bouka Biona & Mpounza, 2009)

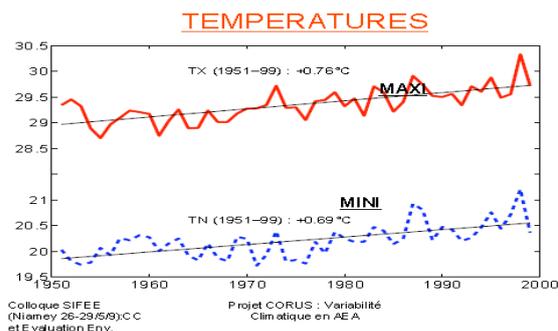


Figure 4 : Tendence des températures sur la période 1950-2000 en République du Congo.

The same source also provides isohyetal (rainfall) maps of the Republic of Congo for the period 1951-70 and 1971-2000, showing a decrease in rainfall in this period.

Figure 5: Rainfall in Republic of Congo compared between 1951-70 and 1971-2000 (Source : Bouka Biona & Mpounza, 2009).

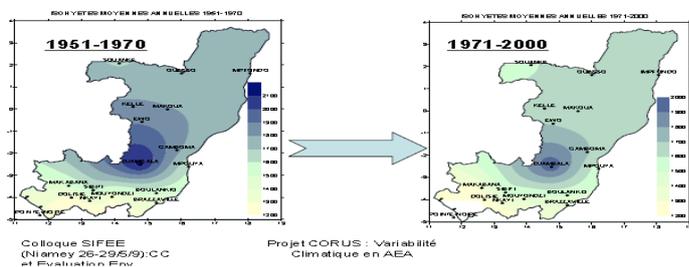


Figure 3 : Évolution des précipitations au Congo montrant l'impact du changement.

This data is supported by other studies, which show reduced rainfall in recent decades: "Overall, in the West Africa/north Congo tropical rainforest belt rainfall levels were 10% lower in the period 1968 to 1997

Forest cover and deforestation

Approximately 60% of the total land area of the Republic of Congo is covered by rainforest. This comprises more than 22 million hectares and constitutes 11% of the forest cover of Central Africa (FAO, 2006). Nearly 75 % of Congolese forest belongs to the realm of production, including 11.6 million hectares allocated to logging companies. The total coverage of protected areas represents more than 3.6 million hectares, or over 11 % of the national territory. Deforestation rates in the Congo Basin (0.17 % according to the World Bank, 2011) are still low compared to large forest blocks in the Amazon or South-East Asia, but these rates are expected to increase drastically in the coming decades, driven by a variety of forces such as industrial logging activities, road development, agricultural expansion (both for subsistence purposes and for commercial agriculture), as well as oil and mineral extraction. Curbing these accelerating deforestation rates means that less carbon will be released into the atmosphere, that habitat for endangered species is conserved, and that other important ecological forest functions (e.g. driving the cycle of rain, providing flood control) are maintained. At the global scale, tropical deforestation is estimated to contribute between 15-20 % of global greenhouse emissions, adding to global warming and furthering the impacts of climate change (World Bank, 2011).

than in the period 1931 to 1960 (Nicholson et al., 2000)” (Somorin, 2010, p.4). There is also some evidence that large rivers in Central Africa experienced reduced flow rates between 1990 and 1995 (Bouka Biona & Mpounza, 2009 citing Laraque et al. (2001)).

Studies on the impact of climatic variations on moist forests show mixed results. Lewis et al, 2009, in a study of 79 sites, found that above-ground carbon storage in live trees increased between 1968 and 2007, which may be linked to increased levels of CO2 in the atmosphere. This, the authors state is, “similar to [increases] reported for Amazonian forests per unit area providing evidence that increasing carbon storage in old-growth forests is a pan-tropical phenomenon”. However, they do state the need for “Improved monitoring and modeling of the tropical environment... to better understand this trajectory” (Lewis et al, 2009). Conversely, other studies, “(e.g. Feeley et al., 2007) find the contrary – tree growth rates decreasing significantly in tropical moist forests in recent years”, (Okali, 2011, p. 74).

The number of studies focusing specifically on the Congo Basin, or the Republic of Congo, is limited. Much of the information available about predicted impacts of climate change in Republic of Congo comes from the country’s 2001 National Communication to the UNFCCC. In general, future scenarios predict a general rise in temperatures and increase in rainfall across the country (République du Congo, 2001; Bouka Biona & Mpounza, 2009, p. 7).

Further, based on global sea level rise predictions of 50cm by 2100, it is estimated that this “could cause floods in the bay of Loango, estuaries and lagoons... The penetration of salty water in the mangrove is also expected. Still on the basis of these thermal projections, the water resources production will be affected by equatorial and continental waters predominance, and by a reduction of in intensity of the Upwelling.” (République du Congo, 2001).

The Congo National Communication states: “The evolution of extreme events, such as floods, low flows and droughts can be foreseen, given that their effects are significant in the floodplain of the Congo Basin and in the Niari Valley...” (République du Congo, 2001, RFUK translation from original French).

First order climate change impacts refers to the immediate physical impacts of climate change while social impacts are typically second and third order impacts, based on an impact on the biophysical environment.

Based on an extensive literature review undertaken by RFUK, the following first order impacts of predicted climate change were identified for the specific case study sites in Congo:

Location	First order impacts of climate change in Congo
Ngonaka; Massif of Chaillu Niari, South-West , is located in the region of Mpoukou Ogoué, in the district of Komono, department of Lékoumou. Rainfalls vary from 1,200 to 1,700 mm per year, distributed as a large dry season from 3-4 months (June-September) flanked by two rainy seasons (October to December and February to May). Early dry season (January to February) is marked by spacing of rainfall and less	Improved conditions of vectoral transmitters of diseases/malaria due to rising temperatures Temperatures are predicted to rise more in the south of Congo than in the north, and by up to 1.1°C in coastal areas by 2050. Studies show that this is likely to heighten the conditions for transmissible diseases, particularly malaria. A second order impact of this increased presence of vectoral transmitters is human health implications. “The potential effect of climate change in areas of existing transmission is noticeable, with 28–42% of new person-months of exposure towards the end of the 21 st century arising in areas presently suitable for the disease” (Tanser et al 2003).

<p>violent thunderstorms.</p> <p>Boucy Boucy; Likouala, northern forest region is located in the district of Dongou in the Likouala region, near the Congo river between the cities of Impfondo and Dongou, in the northern forest region of the country, characterised by rainfall occurring all year (1800 mm/year) with only two periods of reduced rainfall from December to February and in July.</p>	<p>Rainfall instability and temperature rises leading to the deterioration of ecosystem services:</p> <p>Studies predict greater increases in rainfall in the north of the country and temperature rises of over 0.6°C. Together, these would have severe impacts on ecosystems that are already under severe pressure, including second order impacts on the availability of forest products (bushmeat, mushrooms, insects, honey, vegetables and plants) which are economically, socially and culturally very important for indigenous societies. Shortening, or disappearance of one of the seasons may also have second order impacts on agricultural production, which could negatively impact food production patterns and require adaptation. Where crops have reached their maximum tolerance; crop yields are likely to decrease due to an increase in the temperature.</p> <p>Increased rainfall lead to flooding of rivers and changing of river patterns</p> <p>This would have multiple impacts, including flooding of land near rivers at unusual times of the year and changing river patterns. Second order impacts of these may include hindrances to river transport, which is important due to the dependency of communities on the river for food and navigation.</p>
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2.3. Predicted climate change in Eastern Africa

Kenya is already experiencing significant impacts of climate change. Temperature changes monitored by Kenya Meteorological Department (KMD) indicate higher rises in temperature in Northern parts of the country as compared to other parts. Additionally, the country has experienced generally increasing temperature trends over vast areas, depicting for inland areas a general warming trend over time. In the areas near large water bodies, particularly the coastal strip, minimum temperatures show no change, while maximum temperatures show increases since the 1960s. (Government of Kenya, 2010: 28)

United Nations Development Program (UNDP) asserts that Kenya’s mean annual temperature has increased by 1.0 degree Centigrade over the past 50 years, representing an average increase of 0.21 degrees every decade. It is projected to increase to 2.8 degrees by the 2060s.

Projected climate change impact in Kenya:

- rising temperatures
- inundation of low-lying coastal areas
- changes in rainfall patterns
- increase of environmental migrants
- shifts in crop growing seasons
- changes in disease vectors
- increased rate of extinction for many species
- severe water shortages
- heavy deluges and flooding

Fisheries will be affected

The adverse impacts of climate change on fisheries are already being experienced in Kenya. During the 2008-11 drought, low inflows into lakes and reservoirs coupled with high evaporation contributed to receding water levels that were most starkly evident in Lakes Turkana, Naivasha, and Baringo. This reduced the breeding and fishing grounds, as some of the streams feeding the lakes dried up (GoK, 2012). Lake Turkana was seriously affected as a result of the drought on Rivers Omo, Turkwel and Kerio, which feed into it. Similar impacts were noted in Lake Naivasha as Rivers Maraigushu and Karati dried up.

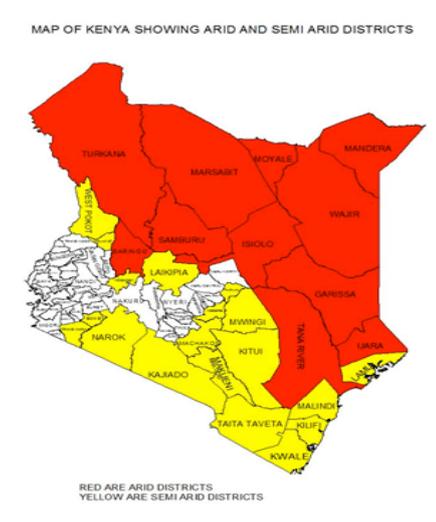
Further projections show that by the turn of the century, temperatures could increase by nearly 4 degrees, causing variability of rainfall by up to 20 per cent (Kabubo-Mariara and F.K Karanja, 2007).

Kenya is currently regarded as a water-stressed country, with poor replenishment rate. There are already indications of reductions in the overall quantity of water available or the timing of its availability. Annual rainfall in Kenya follows a bimodal seasonal pattern with the long rains generally occurring from March to May, while the short rains occur from October to December. With climate change, the rainfall patterns are no longer predictable regarding timing and levels. This disruption

of seasonal patterns has seen the incidence of frequent droughts and crop failures. The main challenge for Kenya is managing increasing water demand together with climate variability/change. The diminishing water sources and decreasing rainfalls have significant implications for agriculture as well as industrial and urban development and have caused migratory communities to encroach into the land of other communities and privately-owned lands, sparking bloody conflicts (Republic of Kenya and CAMCO, undated).

Arid and semi-arid lands (ASALs) are the areas that are currently most severely affected by climate change in Kenya. ASALs are characterized by high temperatures and low precipitation, and unpredictable climate variability. It is projected that these areas will become more vulnerable to climate change, with the increase of both droughts and floods. These are areas where the main economic activities, namely livestock production and subsistence farming, are dependent on rainfall and where the greatest impact of climate change is likely to be felt by people who are already disadvantaged in many respects.

Figure 6:



Livestock production is the main source of livelihoods for pastoral communities that inhabit the ASALs and who constitute nearly 30% of the population. It also makes a significant contribution to the national economy. Greater drought frequency may inhibit crop and animal system recovery, resulting in long-term degradation of grazing resources, continual reduction in herd size, and destabilization of the social and economic standing of resource poor livestock keepers (Padgham, 2009). Other risks include livestock morbidity and mortality, decreasing agricultural productivity resulting in higher prices of staple foods, increased seasonal precipitation leading to increased livestock diseases, decreased livestock productivity, and flash flooding causing livestock losses. . During the El Niño flood of 1997-98 large numbers of livestock died from drowning, with several regions experiencing losses of over 90% (Otiende, 2009). Flooding also increases livestock health risks, as was experienced with the outbreak of bovine disease, *Rift Valley Fever*, following the 1997-98 flood. This resulted in the complete collapse of the main source of income amongst the pastoralists and agro-pastoralists, both due to direct loss of animals and the decrease in livestock marketability. It is suggested in literature (Kabubo-Mariara, 2009, Thornton et al., 2008) that climate change may present some opportunities for livestock systems, but so far these opportunities have not been experienced in Kenya.

The agriculture sector, comprised largely of rain-fed agriculture, highly dependent on predictable rainfall and temperature will suffer too. That will have devastating consequences for the country, as agriculture is the mainstay of the economy. It contributes 26 % directly and 25 % indirectly to the national Gross Domestic Product (GDP), accounts for 65 % of the country’s total exports and provides more than 70 % informal employment in the rural areas. The sector is both the driver of Kenya’s economy and the means of livelihood for the majority of the country’s population (Government of Kenya, 2010).

Kenya is acknowledged to be a forest cover deficit country and in recent years, forest cover has declined significantly as a result of deforestation and degradation. It is now estimated that the country's closed canopy forest cover stands at approximately 1.7% of the total land area, which compares poorly with other African countries, which have an average of 9.3%, and the world, with an average of 21.4% (Government of Kenya, 2012). This situation has come about as a result of poor forest governance, rapid increase in population and demand for human settlements and agricultural land, grazing, sources of construction materials, food, fuel wood, essential oils and herbal medicines (IGAD, 2007). Kenya's forests are dependent on rainfall for their overall health and sustainability. This means that the projected variation in rainfall patterns and quantity will have direct implications on the forests. Climate change will affect the growth, composition and regeneration capacity of forests resulting in reduced biodiversity and capacity to deliver important forest goods and services, and thereby contributing to increased desertification, deforestation and forest and land degradation.

Kenya has five water towers, including the Mau Forest Complex. All of them are montane forests and are under threat due to forest destruction through illegal extraction of forest resources and unplanned or ill-planned settlements. These activities have impacted negatively on the ability of the water towers to act as water catchments for Kenya's major rivers. This has resulted in major river basins indicating a decrease in runoff of up to 17% over the decade ending in 2000. In a context of general global warming, this is cause for alarm.

The combination of high dependence on natural resources as the basis of livelihoods and the foundation for economic development, high poverty levels and low capacity for adaptation, and the existence of other significant environmental stresses, make Kenya highly vulnerable to the impacts of climate change.

Based on an extensive literature review undertaken by MPIDO, the following first order impacts of predicted climate change were identified for the specific case study sites in Kenya:

Location	First order impacts of climate change in Kenya and relevance to the situation of indigenous communities
<p>Lake Turkana in the North-Western part of Kenya, which is the world's largest permanent desert lake</p>	<p>Reduced levels of precipitation</p> <p>This has directly impacted on the livelihoods and food security of pastoral and fishing communities around lake Turkana.</p> <ul style="list-style-type: none"> • The arid nature of the region's rangelands means that any failure of expected precipitation results in pasture loss, livestock deaths, and consequent food insecurity. Recurrent droughts have eroded the pastoralists' livestock (primary) wealth, divesting them of a valued economic and cultural asset, exposed them to livelihood vulnerability, and reduced their resilience in climate change adaptation. • To cope with reduced precipitation, nomadic Turkana pastoralists are more often forced to venture into hostile territories (often beyond national boundaries) in search of pasture and water. This has exposed them to increased inter-group conflict leading to alarming levels of insecurity in the region arising from resource conflict and livestock banditry. • Clearly documented drops of water levels in Lake Turkana are a direct correlation of reduced rainfall in the Ethiopian Highlands, the lake's main catchment basin. Reduced water levels translate into low fish catches, longer fishing hours and distance, increased conflict over fishing rights, and constant risks of over-exploitation. Planned upriver dam projects, by the Ethiopian Government, along the River Omo (the lake's single inlet) are also threatening to escalate the retreat of the lake's waters.
<p>Mau Forest is the largest indigenous montane forest in East Africa and the largest water catchment area in</p>	<p>Reduced levels of precipitation</p> <p>Large sections of Kenya's population directly or indirectly depend on water sources originating in the Mau forest complex. Reduced levels of precipitation may lead to:</p> <ul style="list-style-type: none"> • Threats to indigenous livelihoods systems • Reduced water catchment capacity and poor river flows regulation downstream resulting in flooding and lack of river water.

Kenya	<ul style="list-style-type: none"> • Low groundwater recharge, soil erosion and consequent siltation of water systems. • Forests ecosystem degeneration threatening unique montane plant and animal species • Frequent droughts in the lower Mau leading to resource-related conflicts • Threats to indigenous culture and loss of heritage for forest dwellers from a declining forest system.
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2.4. Predicted climate change in Southern Africa

The IPCC (2007) report states that between 1961 and 2000, there was an increase in the number of warm spells over southern Africa, and a decrease in the number of extremely cold days. Data from between 1950 and 1997 show that mean temperatures for Windhoek displayed an average increase of 0.023°C per annum over that period (Tarr, 1999). The 1980s and 1990s were the hottest decades of the 20th century and together with global trends, several records were broken in Namibia for maximum temperatures during the summer of 1997/98. Since then, Warbuton and Schultz (2005) report that numerous new record temperatures (highs and lows) were recorded over southern Africa for 2003, 2004 and 2005.

Namibia is characterized by five major biomes of which four are desert systems. About 22 % of Namibia's land is classified as hyper-arid desert, 70 % is classified as arid to semi-arid savannah and the remaining 8 % (in the north east) is classed as dry sub-humid savannah (Mendelsohn et al, 2002).

Namibia is the most arid country in Africa south of the Sahara. Rainfall ranges from about 600 mm in the extreme north-east (in an area of less than 6 % of the country) to less than 50 mm in the extreme south and along the entire coast (Mendelsohn et al. 2002). Central- to north-western Namibia experiences one of the steepest rainfall gradients anywhere in the world, ranging from about 400 mm to less than 50 mm over a distance of just 230 km. Rainfall is highly variable and unpredictable with an inter-annual coefficient of variation that ranges from about 30 % in the north-east to over 100 % in the driest areas. The IPCC (2007 (a)) reports increased inter-annual variability in rainfall across southern Africa since 1970, with higher rainfall anomalies and more intense and widespread droughts. Central Namibia falls directly within the 'drought corridor' – the area between 20 to 25° S that experiences high dry spell frequencies linked to El Niño events. These phenomena have become more frequent and intense since the 1970s (Usman & Reason 2004).

Namibia has only four perennial river systems, all of which originate in neighbouring countries and lie close to or on the political borders. All other rivers within the country are ephemeral and, for most of the year, are dry; flowing only briefly with characteristic 'flash floods'. The vegetation that lines the banks of these rivers, supply important wood and *bushfood* (wild edible plants and animals) for communities and fodder for wildlife and livestock in the arid areas of Namibia. Large numbers of rural households, particularly during times of drought, depend on these resources for their survival (Jacobson et al, 1995).

Due to low availability of surface water, the water stored beneath ephemeral river courses or in underground aquifers (dependent on

Temperatures are rising

Midgley et al. (2005) examined temperature records from all available long-term weather stations in Namibia and the bordering Northern Cape Province in South Africa. Roughly half the stations showed significant increases in temperature over their recording period, while none showed a significant decline. The mean decadal increase across all stations during this interval was 0.2°C, an increase that is roughly three times the global mean temperature increase reported for the 20th century. Furthermore, the water balance, a composite measure of temperature and rainfall that determines the water available to plants, has shown a significant decline at five of the fifteen weather stations investigated in Namibia and the Northern Cape. No stations showed a significant increase in water balance over this

Namibia's climate has been arid for millions of years. As a result, the soils are generally poor and many plants and animals display a high degree of adaptation to dry conditions. The Kalahari sands in particular are extremely low in nutrients. The combination of poor soils and low rainfall means that primary agricultural production is low throughout the country, and highly dependent upon annual rainfall. This is reflected in both rain-fed crop production, which is limited to the northern and eastern parts of the country where output is marginal to low, and livestock production, which ranges from marginal in the south and west to moderate in the north and east.

annual rainfall for recharge), provides essential water for rural and urban communities (ibid). High rainfall variability leads to a corresponding variability in runoff, soil moisture and stream flow (DWA, 1991). Due to the high inland temperatures, vegetation suffers high levels of evapotranspiration. The rate of groundwater recharge is very low, below 1 %, and the arid areas of the country contribute very little to the replenishment of vital groundwater supplies (ibid).

The IPCC (2007) identifies the southern African region (particularly in the inland area around the Kalahari desert) as one that will experience some of the highest temperature rises and, as a result, some of the most extreme impacts of global warming. The north and south of Namibia experience the highest temperatures with the average 1999 maximum for the hottest month being over 34 degrees Celsius. High temperatures and low humidity over most of the country for most of the year result in high rates of evaporation. The climate of the coastal belt to the escarpment differs from the rest of Namibia and is influenced mainly by the cold Benguela Current. Temperatures here are generally moderate, fog is frequent (about 125 days per year at the coast dropping to about 40 days per year 80 km inland) and wind is a dominant feature.

Besides the changes in temperature and rainfall, tide gauge records taken from Namibia (Lüderitz) and the west coast of South Africa (Port Nolloth and Simon's Bay) between 1960 and 1992 displayed increasing sea levels. The rate of rise was, on average, 27 mm per decade (Hughes et al, 1992).

It is predicted with a high degree of certainty that Namibia (and the rest of southern Africa) will continue to experience an increase in temperature in forthcoming decades (IPCC 2007). Changes in precipitation remain harder to predict than temperature (ibid). Namibia's naturally high climatic variability compounds this uncertainty.

IPCC (2007) suggests that maximum temperature increases (2-6°C) will occur in Namibia by the 2050 decade. Due to the influence of the cold Benguela Current, warming in Namibia is likely to be considerably less near the coast, than along the escarpment and inland regions of the country (Figure 5). The Oshikoto Region, where the Hai|om reside, falls within an area where extreme increases in annual temperature are expected (possibly in excess of 4° C).

By 2080, the northern regions of Namibia (including the Oshikoto Region) are expected to experience a 10 % decline in rainfall while the central regions (including the inland Erongo region) could experience a 20 % decline in rainfall. These figures are predicted to worsen to 20 and 30 % respectively by 2099.

Increasing temperatures will be accompanied by increasing rates of evapo-transpiration at all localities, with maximum increases in the interior and over the Kalahari Desert (IPCC 2007). Turpie et al (2010) estimate that for every degree of temperature rise in Namibia, potential evaporation (already extremely high) will increase by 5 %. Thus, soil moisture levels are projected to decline dramatically with the cumulative impacts of higher temperature, lower rainfall, lower humidity and higher rates of evaporation. This will have severe implications for plant growth and carrying capacity of rangelands throughout Namibia (although the CO₂ fertilisation effect may counter this in some areas – exacerbating the problems linked to some weed and alien invasive plant growth).

The IPCC (2007 (a)) and Turpie et al (2010) predict that rainfall variability is likely to increase over southern Africa and extreme events such as droughts and floods are likely to become more frequent and intense.

There are currently no credible projections of changes to Namibia's coastal fog regime, which is known to be vital for most endemic and many other plant and animal species that thrive outside the westward

flowing ephemeral river systems (e.g the Kuseb River which sustains the Topnaar community) in the coastal Namib Desert.

Coastal areas are likely to see increased incidence of flooding and inundation, affecting low-lying areas (IPCC 2007(a)). Saltwater intrusion into underground aquifers is also predicted which could influence the survival of certain desert plants (e.g. the *Inara* plant – an important seasonal staple of the Topnaar living in the Kuseb valley).

Based on an extensive literature review undertaken by LAC, the following first order impacts of predicted climate change were identified for the specific case study sites in Namibia:

Location	Predicted first order impacts and relevance to the situation of indigenous communities
<p>Hai om San community, Tsintsabis area in central northern Namibia</p>	<p>Increasing drought and precipitation variability is projected for Namibia as such. This means that high variation from the mean rainfall pattern will become more frequent and extreme. In other words, droughts will be more prolonged and intense, while abnormally high rainfall events are likely to become more frequent.</p> <p>Other impacts for the Tsintsabis area in Central Northern Namibia include:</p> <ul style="list-style-type: none"> • Heat stress and higher rates of evaporation • Lower soil moisture • An overall trend towards declining annual rainfall • Increasing runoff when rains come and lower rates of aquifer recharge (water stress). • Increasing aridification leading to declining plant-cover and species shifts (more arid-adapted plant species moving-in, in place of more sub-humid species). • Increasing rates of land degradation (desertification and, possibly, bush encroachment). • Declining wildlife numbers (11% - 20%) and shifts towards more arid-adapted species (gemsbok, ostrich, springbok) (Turpie et al 2010)
<p>Topnaar Nama community, Namib Naukluft Park along the Kuseb River in western Namibia</p>	<ul style="list-style-type: none"> • Heat stress and higher rates of evaporation • Probable (but yet non-quantified) changes to the fog-regime (less/more fog days will affect the levels of heat stress for humans, plants and livestock) • Lower rates of aquifer recharge (water stress), lower water tables and a decline in plant cover in the Kuseb linear oasis (higher losses of trees and other plants like the staple <i>Inara</i>) • Increased runoff during abnormally high rainfall years inland, with prolonged and intense floods of the Kuseb river (as in 2011). Although this replenishes the underground aquifers, it can wash away trees and <i>Inara</i> plants. • Sea-level rise implies the possibility of saltwater intrusion into coastal aquifers – this will affect the growth of some important plants (e.g. <i>Inara</i>)

2.5. Climate change policies

Climate Change is a global problem, and has been acknowledged as such by the global community since the Earth Summit in Rio in 1992, where the United Nations Framework Convention on Climate Change (UNFCCC) was signed by 166 States. The Convention entered into force in 1994, and now has near-universal ratification (195 States are parties to the Convention at present).

The Convention provides a forum for international cooperation aimed at tackling the climate change crisis. It acknowledges that while climate change is a global concern, the responsibility to solve the crisis is 'shared but differentiated', meaning that wealthier countries, who contributed by far the most to creating the problem of global warming, must also take the lead in solving the crisis. Essentially, wealthy countries have committed themselves to limiting their own greenhouse gas emissions at a fast pace, and support the poorer countries in coping with the consequences of global warming that they now suffer from, as well as build their continued economic growth in more sustainable ways. Implementation of these intentions is slow, and principles of equity and environmental and social justice are debated strongly in the context of the UNFCCC. In recent years, human rights issues have gained increasing – although still limited – recognition in the outcomes of the negotiations under the Convention, reflecting advances in other UN fora such as the UN Human Rights Council, the UN Permanent Forum on Indigenous Issues, as well as the UN General Assembly's adoption of the United Nations Declaration on the Rights of Indigenous Peoples in 2007.

Indigenous peoples are recognised as a constituency under the Convention and as such, they have access to the negotiations as observers and are occasionally allowed to give joint statements in plenary sessions. With the introduction of forest conservation as a tool for climate change mitigation (known as REDD and later REDD+) with the Bali Action Plan adopted in 2007, indigenous peoples got increasingly involved in advocating for their rights to be recognised and respected under the Convention. At present, indigenous peoples make themselves heard in all UNFCCC negotiations on a wide range of issues, even though their access to the negotiations as such is limited.

In recent years, the focus on adaptation has increased in the UNFCCC negotiations. At COP 16 in Cancun, 2010, the **Cancun Adaptation Framework** was adopted in order to enhance action on adaptation. The Cancun Adaptation Framework affirms that enhanced action on adaptation 'should follow a (...) participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and, as appropriate, traditional and indigenous knowledge, with a view to integrating adaptation action into relevant social, economic and environmental policies and actions, where appropriate' (FCCC/CP/2010/7/Add.1, para. 12). An Adaptation Committee was established too, in order to provide technical support to parties, consolidate sharing of information and good practices 'taking into account, as appropriate, traditional knowledge and practices' (FCCC/CP/2010/7/Add.1, para 20b), promoting synergy with other adaptation initiatives, etc.

Least Developed Country (LDC) parties to the UNFCCC communicate their adaptation needs and priorities to the COP through National Adaptation Plans (NAP), which substitute the earlier submission of National Adaptation Plans of Action (NAPA). These also form the basis for funding proposals.

The global governance architecture to address climate change is constantly evolving and as this report is finalized, negotiations about the establishment of the **Green Climate Fund (GCF)** are on-going. The GCF is mandated to support developing countries mitigation and adaptation efforts, and indigenous peoples are concerned about how they will be affected by – or benefit from- the Fund’s investments. Key questions to be discussed include whether indigenous peoples will be involved in decision-making in the Fund’s governance structure; whether their priorities for climate change adaptation will be addressed, and; whether they can access funds directly to enhance their own adaptation strategies.

At the national level, too, policies and institutions dealing with climate change issues are evolving rapidly, but the level of indigenous peoples’ participation varies considerably from country to country.

Climate change policies in the Republic of Congo, have been mainstreamed into the *Plan National de Development* (PND) which runs from 2012-16, focusing on mitigation (forest management) and adaptation (helping communities adapt to climate change). The PND is itself made up of a number of other documents such as the Poverty Reduction Strategy Paper (PRSP)¹ and the REDD Readiness Preparation Proposal (R-PP). Political observers interviewed for this research are sceptical as to how much government activities will follow the PND. As regards consultation, there was no public consultation on the PND, while NGOs in Brazzaville were consulted on the PRSP (but many admitted to not reading the entire 500 page document). In the case of the R-PP, there were public meetings held in the capital of each department, which included indigenous peoples’ participation after pressure from national NGOs and donors.

Namibia ratified the **United Nations Framework Convention on Climate Change** (UNFCCC) in 1995. The Namibia Climate Change Committee (NCCC), established in 2001, is responsible for advising and making recommendations to government on climate change, including how to meet its obligations under the UNFCCC. NCCC membership is drawn from representatives of various government ministries, NGOs, parastatals, and the private sector – but has no indigenous representation. In 2009, a proposed Climate Change Strategy and Action Plan was developed by the Ministry of Environment and Tourism with financial support from UNDP. The strategy emphasizes the need to pay special attention to vulnerable groups, and ensure their participation in climate change response strategies and actions. It does not, however, specifically mention indigenous peoples and their rights.

In the Central and Northern regions of the country, various community-level activities have been initiated for communities to adapt to climate change through improvement of traditional crops and livestock farming to enhance the adaptive capacities of farmers and pastoralists. It appears that no specific activities are in place to address the impact of climate change on indigenous people, other than the distribution of drought and flood aid to communities such as the Topnaar and Hai||om and their livestock.

Interestingly, Namibia’s implementation of the Convention of Biological Diversity (CBD) does specifically address indigenous and local communities. It could thus be argued that it would make sense to mainstream CBD implementation into the framework of climate change response/adaptation and sustainable development, since “ecosystems-based” livelihood strategies are at the heart of both. In other countries too, such mainstreaming could be explored further, given that obligations under the CBD towards indigenous and local communities’ traditional knowledge and customary sustainable use are the strongest among the multilateral environmental agreements.

In **Kenya**, indigenous peoples have engaged in policy development processes such as those leading to the adoption of the National Climate Change Response Strategy (NCCRS) in April 2010 (Government of Kenya, 2010). The Strategy seeks to strengthen and focus nationwide actions towards climate change adaptation and mitigation of Greenhouse Gases (GHG) emissions. It was prepared through a participatory process with the participation of the private sector and civil society, and is to be implemented with the active engagement of all stakeholders. The strategy provides an opportunity for mobilizing citizens and other actors as well as resources and capacities to address the challenges of climate change. The NCCRS integrates indigenous knowledge in adaptation strategies and research. In order to operationalize the NCCRS, the Government of Kenya is developing a comprehensive National Climate Change Adaptation Plan (NAdP), with the support of a number of international development partners. Both the Strategy and the NAdP privilege decentralization and community participation in adaptation processes. An Indigenous Peoples' National Climate Change Steering Committee (IP-NCCSC) has been established to promote more effective participation of indigenous peoples in these and other climate change related processes and to secure their interests in policy and practice. Thus, the ongoing policy, legal and institutional development processes, to the extent that they have privileged stakeholder participation, have provided significant opportunities for reflecting on and designing appropriate strategies for addressing the challenges of climate change. Although a lot more remains to be done in order to translate these opportunities into actual benefits for indigenous peoples, the fact that the policy context has changed favorably cannot be disputed.

3. Indigenous peoples of the African region

3.1. Identification of indigenous peoples

ILO Convention No. 169, in article 1, identifies indigenous peoples as descendants of populations that inhabited a country or geographical region at the time of conquest, colonization or the establishment of present state boundaries and who “retain some or all of their own social, economic, cultural and political institutions”. Further, self-identification is regarded “a fundamental criterion for determining the groups” that are considered indigenous.

The African Commission on Human and Peoples Rights (ACHPR, 2005) has further contextualized this statement of coverage to the African region, emphasizing the following characteristics of African indigenous peoples:

- Their cultures and ways of life differ considerably from those of the dominant society;
- Their cultures are under threat, in some cases on the verge of extinction;
- The survival of their particular way of life depends on access and rights to their traditional land and resources;
- They often live in inaccessible, geographically isolated regions, and;
- They suffer from political and social marginalization and are subject to domination and exploitation within national political and economic structures.

Practically, in the African region, the rubric of indigenous peoples has mainly been applied to pastoralist and hunter-gatherer communities in both arid and forest areas. These communities are directly dependent

Vulnerability is no coincidence

The characterizing features of indigenous peoples immediately speak about their particular vulnerability in the context of climate change: They maintain particular ways of life, which are highly dependent upon access to traditional lands and resources. They maintain their own institutions but suffer from political and social marginalization and domination within the national society.

upon natural resources for sustaining their livelihood and have developed specialized knowledge about the ecosystem as well as adaptive strategies to cope with changes and variations.

The adverse impacts of climate change thus affect indigenous peoples disproportionately, given their greater natural resource dependency. In parallel, they are among the most resourceful in adapting to climate change, given the resilience, flexibility and adaptive capacity of traditional knowledge and institutions (Kronik and Verner, 2009). However, their potential for adapting to climate change is limited by their political and social marginalization as well as discrimination against their traditional livelihoods. Indigenous peoples' traditional institutions are, in most countries, not officially recognized and are marginalized in decision-making (see e.g. Thornberry and Viljoen, 2009).

3.2. Legislative and policy recognition of indigenous peoples

In general, in the African region, there is weak recognition of indigenous peoples' lifestyles, cultures and human rights within the constitutional, political and administrative frameworks of their countries, whereas changes that undermine their existence occur at a massive scale (see e.g. Thornberry and Viljoen, 2009).

Like other indigenous peoples, the **San, Topnaar, Babongo, Bayaka, Baka, Maasai, Turkana and Ogiek** share a history and a present situation of marginalization and discrimination. Their cultural and social life is closely tied with their traditional lands and territories, and form intrinsic parts of their livelihood strategies. These strategies differ from those strived for in the dominant development paradigms of their respective nation states, and they are generally regarded as inferior and backward. Further, their low-impact subsistence strategies make the land they have traditionally occupied and used appear available for other intensive use – wherefore they are vulnerable to encroachment and dispossession. As noted by Thornberry and Viljoen, given “the fact that indigenous peoples' methods of land use are often considered outdated, the assumption may be that indigenous peoples' lands are not used 'productively'. This could be considered to constitute a form of discrimination...” (2009, p.viii). Moreover, only few countries in Africa have elaborated legislation or policies to protect indigenous peoples and “in particular laws concerning land and land-related issues, do not provide any specific recognition or protection of the livelihood and needs of indigenous populations” (Barume, 2010). However, recent developments show a positive tendency in the region.

In 2002, the **Republic of Congo** adopted a new constitution, underpinning the return to democracy after years of armed conflicts (1993-1999). The constitution provides for decentralization, but in practice most local councils still depend heavily on the central government for managing social and economic development. Moreover, in 2011, Congo adopted a Law on Indigenous Peoples Rights (*Loi portant promotion et protection des droits des populations autochtones*). This law is the first of its kind in Africa, and its adoption is a historic development for indigenous peoples in the Congo and on the continent. The law stipulates that “the State ensures that indigenous peoples are consulted in a suitable manner”. Further, it presents legal provisions to ensure civil, cultural and political rights, including rights to education and employment. Article 31 of the law states that indigenous peoples have individual and collective rights to own, possess, access and use traditional lands and natural resources. Currently, there are no regulations (*décrets d'application*) for the implementation of the law, and many local actors are not informed about its existence. At the local level, the notion and specificities of indigenous peoples' rights are virtually unknown,

and there is an extremely low level of representation and participation of indigenous peoples in state structures.

Namibia gained independence from South African Apartheid rule in 1991, and is still in the process of redressing past historical and legal inequalities that were premised on racial discrimination. In its post-colonial era, the Namibian Government ratified most regional and international human rights instruments. There is no specific recognition of the rights of indigenous peoples or minorities, but Namibian legislation includes a number of interrelated Acts that provide opportunities to implement indigenous rights, in particular in the areas of land, leadership, natural resource management and education.

The Constitution provides for the devolution of limited powers and an advisory role of Namibia's Traditional Authorities, recognized in the Traditional Authority Act (25 of 2000). It allows a community to designate a person as Traditional Authority in accordance with customary law, who then has to be approved by the Minister responsible for Regional and Local Government. Traditional leadership in Namibia is closely connected with land and resource rights, and the main functions of traditional authorities are to co-operate with and assist the Government, to supervise and ensure the observance of the customary law, and give support, advice and information, and to promote the welfare and peace of rural communities.

Government responsibilities for overseeing the various acts related to traditional leadership, land, and resource rights are spread across several ministries, and the Government is not providing any support to the Traditional Authorities in terms of resources or capacity-building to fulfil their duties competently. Government institutions mainly negotiate with the Traditional Authorities of the respective communities, ignoring issues regarding the legitimacy of the respective Traditional Authorities, and the existence of other community-based organisations. This, and the fact that benefits for the communities, such as land, job opportunities etc. are channelled through the Traditional Authorities, creates a situation where the institution is prone to abuse.

In Kenya, the recognition of indigenous peoples' rights to land and resources has generally been 'hampered by the lack of an adequate legal framework that gives regard to their culture, way of life, and preferred mode of economic sustenance' (Wachira Mukuni, 2009). However, the adoption of a new constitution in 2010, and a new National Land Policy in 2009, has opened up possibilities for stronger legislative recognition of indigenous peoples' rights to lands and resources: The National Land Policy has provisions on community land tenure arrangements, and the constitutionally established National Land Commission (NLC) is mandated to, inter alia, resolve land-related historical injustices. To the great disappointment of indigenous peoples in the country, though, the National Land Commission has never been instituted, and fulfillment of its mandate thus remains to be seen. Another possibly important development for indigenous communities is the law on establishing an Environment and Land Court, adopted in 2011. The Court will be mandated to hear and determine disputes relating to environment and land, including disputes relating to environmental planning and protection, climate issues, land use planning, title, tenure, boundaries, land administration and management, private and community land and contracts, etc. (IWGIA: *The Indigenous World 2012*).

3.3. The indigenous communities participating in the case studies

The **Babongo, Bayaka, Baka, Topnaar, Hai | om Ogiek, Maasai and Turkana** communities all have their own distinct cultures and lifestyles, centered on livelihood strategies that are closely linked with their traditional lands, territories and natural resources.

The **San** (formerly known as “Bushmen”) and **Topnaar** communities in the arid and semi-arid desert areas

and river valleys of Namibia have traditionally made their living on hunting and gathering, and organized themselves in egalitarian structures where sharing and mutual redistribution of resources formed the basis of their survival. They have lost most of their traditional land, and combine their traditional livelihood practices with food aid and monetary income derived from pensions and daily labour.

The **Babongo and Baka** peoples of the Congo are forest peoples, commonly referred to as “pygmies”. Like the San and Topnaar, their traditional livelihood, culture and social organization is centered on hunting and gathering, and an egalitarian social structure. In Kenya, the **Maasai and Turkana** are pastoralists, living in arid and semi-areas with extreme vulnerabilities linked to climatic changes, whereas the **Ogiek** are forest-dependent communities, now rapidly shifting to more diverse livelihood strategies due to decreasing forest resources.

Numerically, the indigenous forest and desert hunter-gatherer communities in Namibia and Kenya, constitute small minorities in their respective countries while the Maasai and Turkana constitute bigger population groups. However, **There is a general lack of data** on indigenous peoples in Africa, due to a number of factors, including: controversy over definitions and terminology; fluidity of ethnic identity; migration, conflict and wars; lack of legal provisions and political acceptance, weak national capacity for data collection, analysis and disaggregation, and; resistance from indigenous peoples if they are not themselves in control of data (ILO, 2009). Hence, it is often difficult to assess the total numbers of indigenous people as well as the pressure stemming from demographic growth.

Moreover, these communities are ill-equipped to supplement their traditional livelihoods with other sources of income, as they are also marginalized in terms of access to education and employment and are thus often subjected to precarious working conditions, when they access the local market or migrate in search of sustainable livelihoods.

3.3.1. The Babongo and Baka of the Republic of Congo

The indigenous hunter-gatherer population in the Republic of Congo is estimated at 43,378 out of the 3.7 million inhabitants. Even though they are numerically few, indigenous peoples are found in almost all departments of the Congo, and are considered the original inhabitants of the Congo Basin rainforest.

The historical records on the Topnaar in Namibia

illustrate the general challenge in identifying accurate demographical data on indigenous communities in Africa: Records from 1870 estimated the existence of 750 Topnaars (of which 150 – 200 were settled in Walvis Bay). In 1966, records counted 130 Topnaars living along the Kuiseb River, but it was assumed that this was not the total population as many were reported to be living and working on road construction sites at the time. In 1994, a total of 424 residents in the settlements along the Kuiseb River were recorded. A 2011 list of Topnaar households made in connection with a major flood, mentioned 300 households, numbering a total of 1600-1800 people. Whereas the 2011 list was used to identify receivers of food aid after the flood, and thus may have grown by economic and political incentives, the earlier records’ high variations in numbers are probably largely explained by a high degree of mobility between the settlements along the Kuiseb River and the commercial centre of Walvis Bay.

In Congo, over 50% of indigenous children have no birth certificate, compared to a national average of 19%. With no birth certificate, access to state services such as education and health facilities, clean drinking water and electricity, is limited. **The Hai//Om in Namibia** have similar problems, and one informant recounted how he was denied his pension because he could not show a birth certificate proving that the age on his ID card was correct.

Over the past 40 years, indigenous peoples have been brought more into the cultural world of settled Bantu agriculturalists, although at different speeds and to different extents depending on the region. The domination of the indigenous ‘pygmies’ by their Bantu neighbors is often institutionalized to the extent of a “master-slave” relationship. Forced labour, and other forms of systematic discrimination, such as being paid half of what other inhabitants of the village would be paid for completing a task or when selling forest products, is widespread (OCDH, 2011). The Babongo of **Ngonaka** and the Baka of **Boucy Boucy** were originally the indentured servants of Bantu “masters” who had full authority over them.

Figure 7: Map showing the location of Indigenous Peoples’ groups in the Republic of Congo



In the field research sites, **Ngonaka** and **Boucy Boucy**, the population is a mix of Bantu and indigenous peoples. The total population of Ngonaka is 603, of which the Babongo are a small percentage. In Boucy Boucy, the total population is 1,229, of which about 20% or just over 200 individuals are Baka.

The village of **Ngonaka** was created in 1972-73. Ngonaka is surrounded by two rivers, at the east and at the west of the village. Towards the north, there are fields and forests where people practise fishing, gathering and hunting. Ngonaka territory is located in a logging concession, which limits the access and use of forest resources. The Babongo in Ngonaka were originally the indentured servants of Saya Mbani, a Bantu inhabitant of the village, who “gave them” to his son Maboukou Mbani. On the death of Maboukou in 1983, indigenous people were set “free” but they are still facing discrimination, marginalization and use of force in their daily life, such as being obliged to work in the fields or hunt for Bantus to “reimburse a debt”.

Access to modern health facilities such as hospitals is low due to the financial cost involved. Access to basic education is low due to several factors, including the lack of financial resources to support school costs, the hazing of Bantu children and the non-adaptation of the curriculum (in the indigenous culture, at some periods the children should be with their parents in the forest to participate in the gathering of forest products etc.).

Boucy Boucy is located on the banks of the Motaba River, which is the main access navigation channel and source of water for drinking and washing. The River also provides fish for the village. Close by the village is primary forest which has never been logged industrially. This hosts plant and animal resources which constitute the main source of livelihoods for the inhabitants. Large mammals are found at several days walk from the village. There are numerous small streams and ponds in the forest. A small area outside the village is occupied by agricultural fields. There are currently no commercial logging operations in the area,

although these are set to begin shortly. According to the mayor of Boucy Boucy, the village was founded in 1930 by his grandfather, to accommodate the inhabitants of a village further upstream that was prone to frequent flooding. The name comes of the sound made when walking on the wet sand, described by inhabitants as “woucy woucy” and wrongly transliterated by colonial administrators. The first Bayaka or Baka were brought to the village in the 1950s as indentured servants or slaves of Paul Belemene, a prominent Bantu inhabitant and founder of the school in the village. The population of indigenous peoples in the village grew in the 1970s due to migration because of repression and human rights abuses further north.

The Babongo and Baka peoples have a rich cultural heritage with vast systems of knowledge and practices related to the forest they live in. Because of their mobility, they do not amass material assets. Forests provide them a wide range of goods and services such as construction materials, foods, energy, medicines, catchment protection, soil protection, shade, habitat for wildlife and bees, and grazing. Cultural values such as sacred groves, shade, peace trees and plants, as well as meeting places and training areas, are also embedded in the forest, and the spirit of the forest *Ndejengui* is evoked through dancing and other rituals.

The social organisation of the Babongo, the Baka and other forest peoples in the Congo Basin rainforest is based on the clan and the family. Family units composed of the wife, the husband and their children are the basis of society, and play a political and economic role. Communities are organized clan-wise in settlements known as camps (equivalent to “villages”). These camps are units of production and of dissemination of products collected in the forest. Moreover, they are egalitarian political units, where decisions concerning the whole community are made, usually after thorough discussions have led to a consensus. The members of a clan are linked by a strong solidarity based on the common ancestor, and camps are named under the names of the clans, or the names of an elder of the clan, or by the name of the Bantu village, which the camp is linked to. A number of families thus constitute the clan, and family represents the fundamental unit and the basis of society.

Even though the **Congolese** economy has grown significantly since 2008 with the GDP having expanded an estimated 8.8% in 2010, the country continues to face fundamental development challenges. Poverty remains significant, with about half of the population living below the poverty line, and inequality remains high.

Given the lack of administrative recognition of indigenous villages and the weak capacities of representative structures, indigenous peoples are not able to participate adequately in decision making, even at the most local levels. Customary law still plays an important role in the access and management of lands and resources at the local level. As in neighbouring countries, there is coexistence and a complex interaction between customary law (often unwritten and from the pre-colonial era), and state law, or statutory law, described as “modern” and dating from colonial times.

In terms of statutory law, the Babongo and Baka and other forest peoples in Congo are largely governed by the Forest Code adopted in 2000 by the Ministry of Forest Economy. The Forest Code is based on the principle of ‘sustainable management’ of forest resources. Application texts for this law were adopted in 2002, followed by national guidelines for sustainable forest management, published in 2004. The legislative framework encourages the participation of local and indigenous communities in the management of forests, but the mechanisms to allow this are unclear, and field experiences show that communities often complain of not being involved in the management of resources. In the forests that are the domain of the

State, the law recognizes certain customary user rights of indigenous and local communities, but these rights are limited to domestic consumption and do not extend to the marketing of forest products, which are a vital source of income for poor and excluded local and semi-nomadic populations. Analysis of the texts also reveals that people are banned from using certain wildlife resources, as well as mining and hydrocarbons. The state's legal and policy framework for management of land and forest is imposed upon indigenous peoples, who consider the forest as their land, and attempts to manage it through their own management systems and practices, including by following a semi-nomadic life and use a vast area to live on.

3.3.2. The Hai||om and TopNaar of Namibia

The Hai||om are one of six different San groups in Namibia. In total they number around 32-38,000 and are primarily spread throughout the central and northern parts of the country. The Hai||om have traditionally subsisted as hunter-gatherers.

Traditionally, the San depended directly on natural resources for their livelihoods but during the regime of the South West Africa apartheid administration, most of the land of the San was granted or established as commercial farming areas, "homelands" of other ethnic groups, game reserves or national parks. Hence, many San families subsisted as laborers on white-owned farms, established on their own traditional territories. The problem of landlessness became worse after Namibia's independence in 1991, when new labor laws led to a massive reduction of the number of workers on commercial ranches. At the turn of the 21st century, the vast majority of San (about 90 %) lived either in commercial farming areas or in communal areas in which they formed small minority populations (Suzman, 2001). Over the past decade, several thousand San farm workers and their families have lost their residency rights and are trying to make a living in nearby townships with piecemeal work and pension money. They have very limited access to cash-paying jobs, and are arguably Namibia's poorest people.

Land reform has been high on the post-independence reform agenda, with the crucial Land Conference of June 1991 adopting a resolution in support of disadvantaged communities, specifically mentioning the San (Republic of Namibia 1991:36). Likewise, the National Resettlement Policy (Republic of Namibia 2001: 3-4) identifies the San as a specific target group for resettlement, stating that "Members of the San Community have endured exploitation and discrimination at the hands of their citizens throughout history... [they] have suffered tremendously as a result of historical changes caused by the political constellations and ecological constraints...they need to be helped in realizing a new living by developing existing skills and acquiring new ones to be able to secure their sustenance." The Resettlement Policy stipulates that land acquired for resettlement purposes will be provided to beneficiaries on leasehold of 99 years and that they can use the lease agreement as collateral to get a loan from lending institutions for agricultural production purposes. However, to date not a single resettlement beneficiary has received a leasehold agreement from the government. The lack of tenure security for resettlement beneficiaries remains a contentious topic and the Agribank is cautious with regard to granting them loans as they have no legal ownership interest in their land.

Two Hai||om settlements are included in this study; **Tsintsabis**, which is on the western edge of the Kalahari Basin, and; **Farm Six**, about 50 km northwest of Tsintsabis. Both sites are within the traditional Hai||om territory, but the colonial as well as the post-colonial state has allocated much of the land to other users and the settlements constitute only minor sections of what was their ancestral land.

Tsintsabis, app. 60 km north of Tsumeb is a 3,000 hectare piece of land, on which 80 households, mostly San, were resettled by the Ministry of Lands and Resettlement. Each family was granted a 10 hectare plot of land, of which not all are suitable for intense agricultural use, since some are too sandy. Over the years, far more people have moved into the area, and the present population is estimated at 3-4,000 people. There were further farms bought in the vicinity, with the idea that Hai||om with livestock could use the farms for grazing, but mainly other ethnic groups got hold of the grazing. There were accusations that the headman was allocating land to outsiders, which would be against his mandate, as resettlement farms falls under the Ministry of Land and Resettlement (MLR).

"We feel like prisoners between the commercial farms and the Owambo farmers. People are coming from far to settle on our ancestral land."

Quote from San informant

Farm Six is one of eight cattle posts in the 80,000 hectare Mangetti West Block, situated to the North-West of Tsintsabis on traditional Hai||om territory. The cattle posts were originally established by the South African Administration as quarantine camps for livestock moving from the northern communal areas into the commercial farmlands to the south. Today, the Mangetti West Block is leased from the Government by the Namibian Development Corporation (NDC), a government-owned development enterprise, governed by an independent board.ⁱⁱ According to the farm manager, NDC counted approximately 400 San living in Farm Six in 2011. The living standard of the Hai||om at Farm Six is even lower than that of the Hai||om at Tsintsabis, and they depend to a higher degree on natural resources, in particular bushfood. However, their access to land gets increasingly limited. Due to a grazing dispute, a considerable amount of land is currently being sub-leased by the NDC to Owambo farmers until they can find alternative grazing for their cattle. This land includes areas with valuable resources previously used by the Hai||om, but now they are only allowed to use the area in exchange for piece work they provide to the farmers. Owambo farmers apparently accuse the Hai||om of cattle theft when they enter the area. With the current lack of access to their traditional lands and territories, their knowledge on bushfood becomes less and less relevant.

As many other hunter-gatherer societies, the Hai||om have not customarily had a single traditional leader. Instead, headmen of smaller family groups had certain responsibilities, especially in the context of natural resource management.

Customarily, the **social organisation of the various San groups** made no provision for a single leader. Hence, San communities often have a poor understanding of their role in the overall national governing system and often lack internal role models for leadership positions. The **Traditional Authorities Act** relates essentially to the traditional system of Oshivambo speaking groups, who constitute over 50 % of the Namibian population, as a "one size fits all"-model. San communities perceive the institution of Traditional Authority as an important tool to make their voices heard. Consequently, San, with the support of NGOs, fought for many years for the recognition of their own traditional authorities. The Hai||om Traditional Authority was recognized by Government in 2004. However, many community members don't know how their chief came into power, and mention that affiliation to the ruling party might have played a strong role. They feel unrepresented by the chief, who based in the town Outjo, is said to care mostly for the Hai||om in that area and his own relatives. There is a local headman in Tsintsabis, who is also the senior councillor of the Hai||om Traditional Authority. Whenever the community has a problem, for example losing land to other ethnic groups, it appears that they can only turn to the local headman, but he has been facing criticism because he allegedly gave land away to outsiders.

With regard to local government institutions, the office of the Ministry of Land and Resettlement (MLR), located in Tsintsabis, is not perceived to offer much help to the community. Apparently the local MLR office does not want to offer assistance to their pleas and when the community take their complaints to the regional councillor they are referred back the MLR officer. The situation at Farm Six is worse. The Hai||om at **Farm Six** do not have any elected representative or official headman. In fact, they do not even know the Traditional Authority based in Outjo. Also, it is even more difficult for them to reach Government offices because it implies considerable transport costs and efforts. The community has the feeling that the Government and the Regional Council are only visiting the community and listening to their problems during election time. One of the community members said that they were informed at Independence that Namibia was now a democratic country, and that everything would be fine, however, the only thing that was brought to Farm Six was poverty.

In order to “develop” San communities in Namibia, the Office of the Prime Minister (OPM) implemented in 2005 the San Development Program. The objective of the program is to ensure the integration of the San into the mainstream of Namibia’s economy. The San Development Programme is characterized by a top-down approach and a paternalistic attitude towards the various San communities. It lacks clear vision, and hand-outs rather than empowerment of the San, predominates the program. For the people at Tsintsabis and Farm Six, food aid is the most tangible outcome of the program.

There are only two hospitals in the Oshikoto Region where the Hai||om San live, and they often have to walk long distances to reach the nearest clinic. An outreach programme has been planned – but is not implemented due to budgetary constraints. The quality of education in the Region has been generally criticised in the Participatory Poverty Assessments (PPA) of the Region (NPC 2007; 2007(a)). It is reported that many children of poor households stay away from school, or drop out, and that a particular challenge exists with the San. The PPA concludes that as long as the San communities remain dependent on gathering natural foods for subsistence, their children are likely to accompany their parents in search of food. This is an over-simplified picture, and other factors behind the school-drop-out observed in the field research include discrimination by other children, no financial means to pay fees, school uniforms and soap, no mother tongue education and girl child pregnancies. In both Tsintsabis and Farm Six, informants mentioned that the quality of the schooling was poor, and that lack of proper education was one of the main problems of the Hai||om San.

Poverty pockets within generalized poverty situations

According to 2003-4 figures, 41% of the Namibian population could be classified as either poor or severely poor (NPC, 2008). The extent of San marginalisation is clearly evident in the socio-economic indicators of human development, where the situation of the San is consistently worse than for other groups in Namibia (UNDP, 2007)

The **Topnaar community** constitutes around 1,800 people and is a sub-group of the Khoe-speaking Nama, who number some 70,000 people in total. The Topnaar live in small settlements along the **Kuiseb River** in the Namib Naukluft National Park, which covers almost 50’000km² in the western part of the central Namib Desert (Erongo Region). This area has been arid or semi-arid for an estimated 80 million years. Over this extensive period the plants and animals have been able to adapt to extremely harsh climatic conditions. Evidence of Stone Age life in the Kuiseb River dates back 200’000 years and archaeological evidence indicates that the area was used by semi-nomadic communities when rain provided enough grazing for animals (Ministry of Environment and Tourism). The Topnaar community has over centuries developed a livelihood based on the scarce natural resources available. More than a century ago, Queen Victoria of the British Empire guaranteed them rights of residence in the area. In 1907, the Sperrgebiet (meaning the “prohibited area”, due to diamond mining) was proclaimed, and the Topnaar were denied access to a large part of their traditional hunting areas. The proclamation of the Namib-Naukluft Park, and its expansion, between 1968 and 1990 further reduced the nomadic range of these people. During the 1970s, in response to a request from the Topnaar, boreholes were drilled in the Kuiseb river valley, and permanent settlements became a way of life, ending the nomadic existence of most of the Topnaar. Many of the Topnaars have migrated to coastal towns.

Traditionally living as hunter-gatherers, the **Topnaar** community in **Namibia** remains highly mobile, which was experienced by the researchers when they tried to get a complete overview of the population in the case study communities. This proved to be no simple task, as non-permanent residency was common.

The Topnaar social organization is egalitarian, and during most of the 20th century they did not have a recognized political structure as such. The last Chief of the Topnaar, Piet #Eibeb, died in October 1910 (Dentlinger 1983: 72-73 in Werner 2003: 26ff), and for the next 70 years no proper traditional authority existed. Due to the advent of political reforms, in 1975 things changed and subsequent political developments were premised on ethnic representation. Consequently, in 1978 the first Administrator-General of Namibia appointed a temporary headman for the Topnaar. In 1981 an election was held for a successor and four councillors.

The Topnaar live in the second wealthiest region in the country (Namibia Household Income and Expenditure Survey, 2009-10), but they are living in a remote area, and have been identified as the most marginalized group in the region. High levels of unemployment, due to poor education and a low level of skills, is a major cause of poverty (NPC, 2006).

Communal conservancies and national parks are important land governance structures that loom large in the past, present and future of the Topnaar and San peoples in Namibia. For example, the Topnaar live in the Namib-Naukluft National Park, while the Hai||om have close historical and cultural relations with the Etosha National Park that has been established on their traditional territory.

The Communal Land Reform Act 5 of 2002 was passed by parliament in 2003. Community-based natural resource management could be an avenue for the Topnaar and the San to gain stronger tenure rights. However, there is a disjunction between land rights and natural resource rights in communal conservancies. The absence of constitutional recognition of customary land tenure rights in communal areas resulted in communal farmers and traditional authorities having no statutory law remedy to defend their rights. As a result, powerful interest groups such as civil servants, political figures or self-made businessmen often used this policy and administrative vacuum to their advantage and ignored customary land tenure rights to fence off large tracts of communal land to the detriment of subsistence communal farmers (Odendaal 2010: 3). Often those who fence off land unlawfully, claim they obtained authority to do so by relevant traditional authorities (Odendaal 2010). Despite widespread criticism against such practices, government yet has to take political action in formulating and enforcing guidelines on the removal of unauthorised fences. The issue of communal land rights must therefore be directly addressed in conservancy law (Harring and Odendaal 2002) to allow communal conservancies the legal authority to administer their own lands with support of their respective Traditional Authorities and Communal Land Boards.

3.3.3. The Ogiek, Maasai and Turkana of Kenya

The three indigenous communities addressed in Kenya are **the Maasai, the Ogiek and the Turkana**, all of them living within the Rift Valley Province of Kenya and in the counties of Narok, Nakuru and Turkana, respectively. The three communities have long historical connections with the areas in which they live, and have retained their socio-cultural links with the land and environments that they depend on to support their livelihoods.

In **Kenya**, Indigenous peoples suffered a long history of marginalization extending from the colonial to the post-colonial period. As numerical minorities, they were marginalized from key political processes. There is no specific legislation governing indigenous peoples, but the 2010 Constitution provides a rich and

complex array of civil, political and socio-economic rights, including collective rights, that are of relevance to indigenous communities (IWGIA, 2012). The Constitution contains strong provisions regarding the sustainable exploitation, utilization, management and conservation of the environment and natural resources, and imposes a duty on both the state and citizens in this regard. Significantly, it recognizes that citizens cannot enjoy important rights in the absence of a sound natural environment. It entrenches imperatives of decentralization, participation and equity, with particular attention to previously marginalized groups (Republic of Kenya, 2010). This provides an avenue for local -level adaptation to climate change through strategies and interventions designed by the local people in response to their specific realities. This is reinforced by the National Land Policy, and the recently approved Sessional Paper on Sustainable Development of Northern Kenya and other Arid Lands (ASAL Policy), which have opened up new opportunities by acknowledging the need for special interventions to address the specific concerns of marginalized groups and minorities, including indigenous peoples.

The 2009 Population Census puts the number of **Maasai** in Kenya at 841,622. The specific Maasai groups (sets or clans) involved in this case study are a combination of the Purko (*Ilpurko*) and the Keekonyokie (*Ilkeekonyokie*) that live in Narok North and Naivasha districts, within Narok and Nakuru counties respectively. The Maasai are said to have migrated from the Nile valley in Ethiopia and Sudan to their present day location in central and south-western Kenya and northern Tanzania about 1600 AD. Up to the 19th Century, the Maasai controlled much of the land extending through what is now the Rift Valley Province in Kenya and into Northern Tanzania. They were fierce warriors endowed with large numbers of livestock that roamed the free rangelands in the region. Towards the late 19th Century, the Maasai suffered a string of natural calamities including drought, smallpox and cattle pest that decimated both human and livestock populations, leaving the community weak and vulnerable when the colonialists arrived towards the end of the century. Although the Maasai were among the first African communities to come into contact with European missionaries, they have managed to maintain their traditional ways even as they interact with modernization and get integrated into national and global systems and economies.

The Maasai community targeted in this study depends on the environmental services of the Mau Forest as a water catchment area, and has thus been affected by the degradation of the forest arising from climate change and other factors. More directly, the community depends on Lake Naivasha, which also feeds off the Mau Forest Complex. The lake has in recent years suffered substantial degradation as a result of competing land uses, especially arising from the establishment of large horticultural farms for production of flowers for the European market. The farms established around the lake have directly impacted on the availability and quality of water in the lake, in addition to blocking access to the lake for Maasai livestock. This has generated conflicts that have at times turned violent, as the Maasai have sought to assert their historical rights to the lake and its resources in support of their livelihoods.

Historians acknowledge the **Ogiek in Kenya** as the original inhabitants of the Central Rift Valley, having settled here before the arrival of Maa speaking communities (Kamau, undated, Yeoman, 1993). They are thus probably the only community that can claim to be aboriginal East Africans as there is no evidence of their having come from elsewhere. They have, however, been squeezed from all directions by their more powerful neighbors, and ended up scattered across Kenya and into Tanzania. The total population of the Ogiek in Kenya is estimated at 20,000, while those living in the Mau Forest are estimated at 11,000. The Ogiek directly involved in the case study are those residing in the Mau Forest complex, in the Nesuit Location, Njoro Division of Nakuru County. Their population is estimated at 2,300.

The Ogiek have traditionally lived in caves in forests, practicing hunting, fruit gathering and bee keeping. Over time, they have been influenced by their interactions with neighboring Maasai and Kalenjin communities, and although still living largely within forests, they now construct houses, and have diversified their livelihood strategies, to also include livestock keeping and farming. The fate of the Ogiek is closely tied to the integrity of the forest. Indeed, the degree to which Ogiek rights to the land in the Mau Forest complex has been threatened is the same degree to which the sanctity of the forest has been compromised. The threats to the forest, and by extension to the Ogiek, have been the subject matter of much concern across the country and even within the East African region given the importance of the forest as a water catchment area for much of Kenya and Tanzania. A Government Task Force on the Conservation of the Mau Forest Complex was established by the Prime Minister of Kenya in July 2008, to look into the matter and recommend strategies for arresting the situation and rehabilitating the forest complex. The Task Force Report issued in March 2009 identified the Ogiek as the community whose land rights had been compromised through illegal excisions of land from the forest, and allocation of the same to individuals and groups from other parts of the country. The report recommended, among other things, that the government works with the community to reaffirm their land rights within the forest and to cooperate with them in the management of the forest resources (Republic of Kenya, 2009). The Task Force was succeeded in 2010 by an Interim Coordinating Secretariat (ICS), tasked with implementing the livelihoods as hunter-gatherers had been most adversely affected by the destruction of the forest, and recommendations of the Task Force's 2009 report (IWGIA, 2012).

Key points regarding Ogiek current situation:

Identified at a community meeting 19th September 2012 by 30 men and women of the Ogiek community.

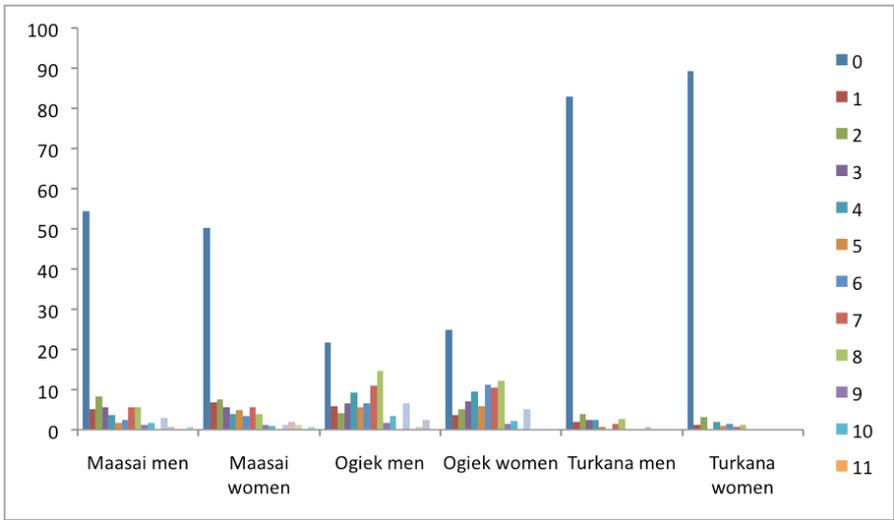
- The depletion and deterioration of the Mau Forest ecosystem impact Ogiek livelihoods and natural environment. Depletion has been gradual since former president Moi's regime, when loggers armed with government licenses indiscriminately logged trees even within indigenous trees zones utilized by the Ogiek. Tree diseases and pests (such as aphids), and forest fires have increased the loss of forest cover.
- Traditionally, the Ogiek sub-divided forest zones into family territories for hunting, honey harvesting and plant collection. Families had responsibility and protection rights over such territories and had enforceable cultural recourse in case of incursion. Government logging licenses overrode Ogiek's forest tenure and resource allocation arrangements and transformed the forests into open access resources where loggers and locals competed against an ineffective government forest department.
- Technology is a contributing factor in forest depletion and lifestyle changes. The tractor and the power saw have made possible the felling of trees in hundreds of acres a day, compared to the traditional axe. The power saw was described as "Ogiek's forest enemy number one".
- Land tenure changes occurring in recent years are transforming the local landscape and socio-economics. Individual land holdings has created individual prerogative in land use and conservation. It has also lead to sedentarization and adoption of cultivation and livestock rearing, both now the main livelihoods practices for the community. Honey and hunting remain culturally significant, but not economically viable.
- Immigration and settlement by non-Ogiek people has led to "cultural dilution" and threat of assimilation by more populous migrating communities. Ogiek people expressed alarm over loss of language and traditional lifestyles. Many parents are now giving children non-Ogiek names, which makes the identification of Ogiek people difficult during allocations of opportunities meant for Ogiek. To address this, Ogiek have an effort underway to create an official a register of the Ogiek people.
- Some economic benefits and livelihood exchanges have come with migrating communities, but also brought political and resource conservation challenges. Ogiek are increasingly out-numbered in their locality and cannot elect their own political representatives to office. Further, they see political motives in the elected leaders' inaction regarding forest degradation; leaders hesitate to deal firmly with people destroying forest resources for fear of losing their political support. The Ogiek also note differences in cultural perspectives regarding the use and place of wildlife. Customarily, the Ogiek did not hunt pregnant or young wildlife, but rather selectively managed hunting to ensure herd sustenance. Other communities do not always observe this rule and wildlife has almost been completely hunted out in Ogiek territory. One Ogiek woman pointed out that she has not seen a single wild animal in the area for the past two years.

The **Turkana** are a Nilotic, semi-nomadic pastoral community living in the Greater Turkana District, an arid and semi-arid region to the northwest of Kenya. They are said to have moved into this area between 1500 and 1800 AD. The population of the Turkana is 855,399 according to the 2009 National Population Census. The case study was conducted in Namukuse Location, which is in Kalokol Division within Turkana Central.

Lake Turkana is the life-blood of much of the region and livestock is the backbone of the Turkana livelihood, and defines much of their culture and economy. Livestock are a source of milk and meat, and their numbers are an important measure of wealth. Men with large herds are often polygamous as they are able to pay for and support many wives. The ecological diversity of the area is significant, with parts of it well watered by Lake Turkana and Rivers Turkwel and Kerio. The rivers occasionally flood after heavy rainstorms, depositing sediment into the river plains that are then cultivated. However, the area is prone to long periods of drought during which the rivers dry up, and families have to travel long distances to access water for livestock and domestic consumption. Lately, the government has been actively promoting irrigation agriculture in the Lake Turkana Basin and along the major rivers with a view to promoting livelihood diversification to deal with the increasingly frequent droughts in the area. In addition, recent discovery of oil in the district has opened up new possibilities for addressing livelihoods and development challenges in the area, although concerns have been raised about the extent to which local people and the local economy will benefit from exploitation of the oil. There are also concerns about the implications of oil discovery and exploitation for the land rights of communities. Lake Turkana has also come under pressure from hydro-power developments by Ethiopia upstream that threaten to divert the lake's water supply and to undermine fishing, agriculture and livestock production that is dependent on this water source.

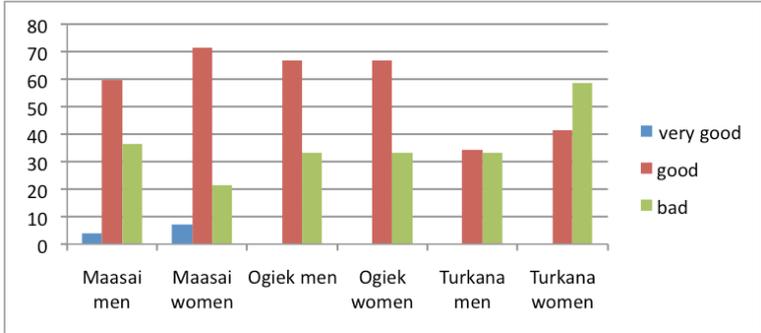
Social indicators across the **Maasai, Ogiek and Turkana** communities present a mixed but generally bleak picture as illustrated in the table below regarding education levels. Among the Turkana, nearly 90 % of female respondents have not attended any formal education while more than half of the Maasai respondents (52.3%) fall into the same category. Ogiek respondents stand out as only 23% have not had any formal education. The situation is pretty much the same across the entire spectrum of education, with the Ogiek respondents scoring the highest, Maasai in the middle and Turkana the last in the number of respondents with concluded primary school (8 years), secondary school (12 years) and post-secondary schooling (16 years) .

Figure 8: years of formal education



Access to health services was assessed by reference to the quality of public health services'. The results shown in the Table below indicate that only among the Maasai were there respondents who categorized their access to health services as 'very good', although they constituted less than 5% of the respondents in that community.

Figure 9: Community perceptions, quality of public health services



Access to traditional health services is more widespread among the indigenous communities. Among the case study communities, all the Maasai respondents, both men and women indicated that they have access to traditional health services. 92.2% of Ogiek male respondents and 86.4% of the female respondents have access to traditional health services. Among the Turkana respondents, 90% of the male and 80% of the female have access to traditional health services.

3.3.4. Summarizing key features of the indigenous communities

This brief introduction to the Babongo, Bayaka, Baka, Topnaar, Hai| |om Ogiek, Maasai and Turkana communities confirms the picture of peoples with unique cultures, identities, histories and livelihood practices, closely tied with their traditional lands and territories. Historically, these peoples have developed

distinct social and political structures, such as clans, age-sets or egalitarian consensus-seeking structures, mandated with the responsibility for natural resource management and securing the necessary flexibility and mobility to optimize the sustainable use of scarce resources. These communities are, to varying degrees and more or less recently, facing disruption of traditional livelihood practices, mainly due to factors beyond their control, such as discriminatory colonial and post-colonial land rights regimes, influx of settlers and large-scale development projects. Further, they live in countries with generalized poverty situations and relatively weak governance institutions, with limited capacity to reach out to numerically few and remote communities. The situation is aggravated by discriminatory attitudes against indigenous peoples' cultures and livelihood strategies, reflected in non-recognition of their traditional governance institutions, encroachment on their lands and exploitative relationships with neighbouring communities. In the most extreme cases, this is conceptualized as a "master-slave" relationship, qualifying as forced labour under international law. These communities are thus under double pressure; on the one hand, their traditional knowledge and practices are under pressure and becoming less and less relevant. On the other, they are marginalised with regards to access to social services such as education, which, moreover, are often inappropriate for their situations and needs. Thus, as changes are occurring, they are incorporated into a discriminatory labor market in a very disadvantaged position with low level of the skills necessary to make positive use of emerging non-traditional opportunities and livelihood elements. On the positive side, the studies confirm that these indigenous communities all, although to varying degrees, maintain elements of traditional knowledge and practices, such as traditional health practices and specialized knowledge of forest resources, which constitute essential resources for their survival under very difficult circumstances. The following section will further explore the importance of traditional knowledge and livelihood practices for these communities.

4. Livelihoods dependent on land and natural resources

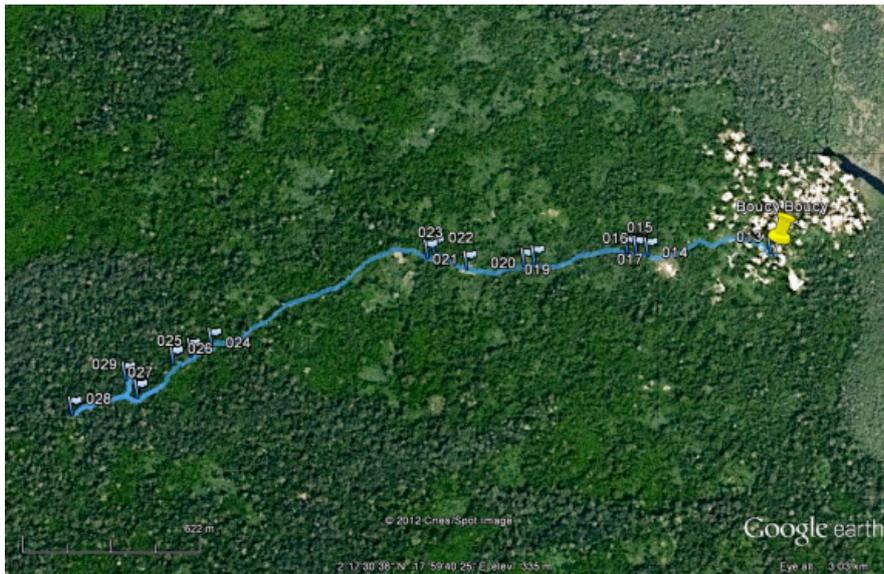
One of the defining features of indigenous peoples in Africa is that the survival of their particular way of life depends on access and rights to their traditional lands and resources (ACHPR, 2005). As can be seen from the following, all of the case study communities are to some extent dependent upon use of traditional land and resources, combined to varying degrees, with other (non-traditional) livelihood elements.

4.1. Baka and Babongo livelihoods

The Babongo and Baka, like other forest peoples of the Republic of Congo, have unsurpassed knowledge of the forests and both case study communities demonstrate a vast knowledge about forest resources and ways of using them. In **Boucy Boucy**, the community demonstrated in a transect walk their knowledge about harvesting water from trees and roots, digging water points to access clean water, setting traps for small mammals, using a wide range of barks and leaves as traditional medicines, harvesting wild fruits and roots and fishing.

Non-timber forest products (animals, fruits, seeds, flowers, etc.) represent fundamental resources for the Baka and Babongo. Studies have revealed around 800 different species that are used for food, construction, tools, heating, medicine and

Figure 10: Route of transect walk, with notable points marked, Boucy Boucy



Source: GPS data in Google Earth

Key: 13 – village; 14 – medicinal plants (kongo bololo for malaria); 15 – medicinal plants (kougou for fever and sore throats); 16 – edible wild roots (igname sauvage); 17 – wild fruit (bemba); 18 – sacred site (coffin of baby twins); 19 – vine from which water can be drunk; 20 – medicinal plant; 21 – trap for porcupines; 22 – track crossroads for path to Pokola; 23 – medicinal plant for coughs; 24 – indigenous community agricultural field; 25 – gathering wild manioc (écoumé); 26 – vine from which water can be drunk; 27 – medicinal plant (nganda); 28 – fishing site; 29 – stagnant water point.

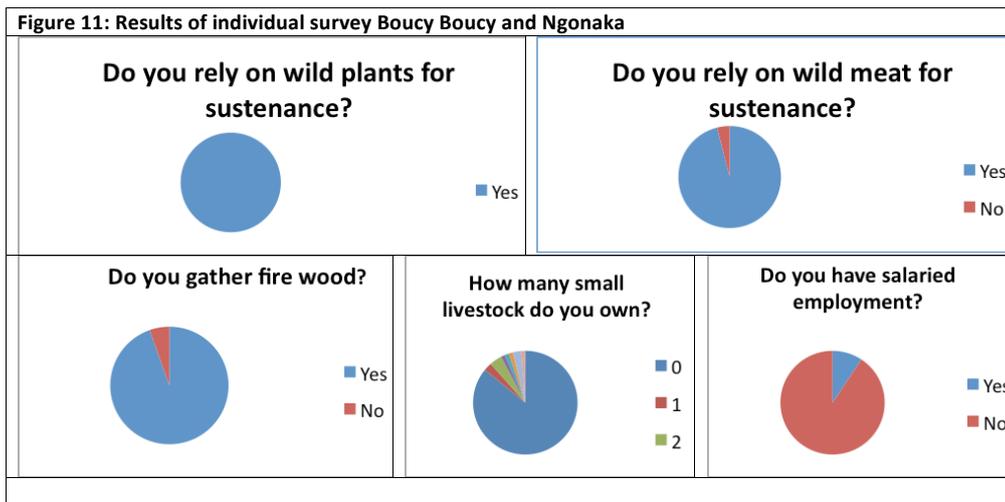
Traditionally, the Baka and Babongo led a semi-nomadic lifestyle, based on hunting and gathering of forest products. This way of life is characterised by mobility over a vast territory, where a hunting expedition can involve a four-day walk into the forest, the gathering of wild plants can require a two-hour walk away from the village – and some community members may be away for months, exploring far flung hunting areas. Even though this way of life is changing rapidly, as indigenous peoples have settled along roads and alongside Bantu villages since the 1960s, the case study data show a very high dependence on traditional subsistence resources. Specific tasks are distributed among the members of a family and a camp: men usually hunt, while women gather forest products. Children play an important role and assist their parents in economic activities. Each person decides on a specific activity, depending on daily needs, such as hunting, checking hunting traps, gathering of honey, plants etc.

Deforestation rates in the Congo Basin are still low compared to large forest blocks in the Amazon or South-East Asia (0.17 percent/World Bank, 2011), but these rates are expected to increase drastically in the coming decades. There are four logging concessions around the case study site of Ngonaka, and although there are currently no commercial logging operations in the Boucy Boucy area, these are set to begin shortly.

In **Ngonaka** logging and mining include the movement of vehicles in the forest, construction of roads and the use of certain chemicals. These aggravate and precipitate environmental degradation, the loss of biodiversity and other impacts such as water pollution, the decline of certain wild plants used for economic activities and/or medicine by local communities. It is often the same trees that are prized for their medicinal qualities or as

'caterpillar trees' that are targeted by logging companies for their wood. In **Boucy Boucy**, the presence of eco-guards in hunting grounds several days walk from the village, acts as a restriction on the animal resources that indigenous peoples traditionally extract from the forest. There is currently no industrial logging in **Boucy Boucy**, but it is slated to begin in the near future, and would likely further negatively impact the local environmental situation. The impact of population growth and migration cannot be known accurately. The population of the Likouala Department doubled, according to some estimates, in 2009 with migrants escaping conflict and crossing the Oubangui River from the Democratic Republic of Congo. This has anecdotally increased pressure on the forest.

Field data from **Ngonaka and Boucy Boucy** confirms the dependency on traditional land and resources. As can be seen in Figure 11 below, all of those interviewed reported relying on gathering of wild plants, 93% rely on wild meat, 89% gather fire wood. Further, 85% do not own small livestock and only 9% have formal salaried employment.



In **Ngonaka**, almost all people practice hunting and gathering of forest products as their main economic activity. Key resources are wild pig, antelopes, monkeys, rats, asparagus, leaves, wild fruits, mushrooms, caterpillar and honey. The main source of income is the trade of forest products and agricultural products; mainly cassava, but also maize, peanut and yam. In Ngonaka, only 4 out of 44 people interviewed have had a formal job in the local logging company. Some of the households own small livestock, mainly chicken and goats, but many of them do not. Over the past 20 years, the community has abandoned some traditional hunting techniques (such as hunting game with nets, bows and poisoned arrows), similarly they have begun to fish with a line and rod instead of a spear. In the past two years, indigenous peoples of the village have begun to practice agriculture too, although currently at a small scale.

The community members in **Boucy Boucy** have only very recently – in the past two years – begun to farm crops for themselves. Many external institutions such as the state, local authorities and development projects push

them towards a more settled life. This assimilation of indigenous peoples by the Bantu may lead to the gradual erosion of their forest knowledge and cultural values.

4.2. Topnaar and Hai||om livelihoods

Traditionally, the **Topnaar** were nomadic hunter-gatherers, entirely dependent on the seasonal harvesting of *!nara* melons and other plant as well as fishing and hunting wildlife but this purely traditional lifestyle has not been in evidence for at least 120 years. Other livelihood strategies include wages and small pensions from family members working in towns such as Walvis Bay, or at the Desert Research Institute at Gobabeb. Food aid and piece work has also played a role in shaping the livelihoods of the Topnaars over the past fifty years. However, opportunities for employment on farms in this mostly hyper-arid and arid region are severely limited, particularly without education and skills (Hoadley 2005).

Current park and conservation regulations do not allow the Topnaar to hunt inside the Park where they live, and only once a year is the Traditional Authority allowed to harvest game in the park, after which meat is distributed to the communities. Due to the aridity of the area, farming is only possible along the Kuiseb River and livestock never strays too far away from water points located on the banks of the Kuiseb River. Sometimes during good rainy spells, livestock is allowed to share grazing with game on the plains.

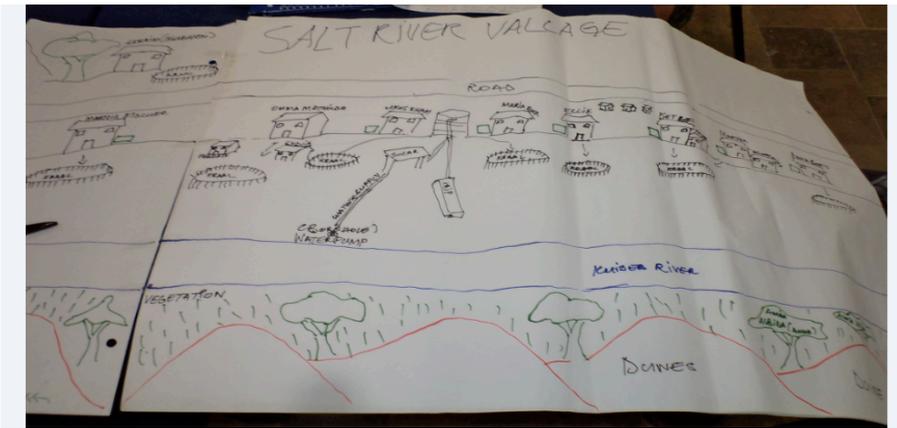
The Topnaar community drew a village map (see photo below) to explain the importance of the various natural resources and physical assets. First of all, there is a road dividing the residential area from the north, secondly the Kuiseb River has important trees such as Camelthorn and Ana trees. Thirdly, there are different water points, gardens, grazing areas for the livestock and *!nara* bushes. Lastly, the Gobabeb Research Centre is important because it provides employment and other emergency support.

Village Resource Map of one of the Topnaar Settlements: Soutriver

Government subsidies

Subsidies from the state in the form of pensions and different forms of food relief play an important role in current Topnaar livelihoods. 14 out of 37 interviewed households have a member who receives **pensions**, and this cash income is used collectively by the household, and pays for food as well as for school fees, etc. Pensions are seen as the most reliable source of regular income, and households who receive pensions have on average more livestock compared to people who don't have pensions.

Drought and flood relief in the form of basic food supplies such as maize meal, cooking oil, sugar, fish, etc. is distributed 3 and 6 times a year respectively. However, these supplies are only given to people who have a homestead, and only when they are at home – which many Topnaar are not, with 30 of 35 households having members living outside of the settlements at the time of the field research.



The development of 10 permanent water points along the Kuiseb River since the late 1970s has encouraged settlement and an increase in livestock. Before, the Topnaar community depended on the water from natural pools, springs in the river and hand dug wells (gorras). In 2000, solar pumps were introduced to replace the wind-pumps and diesel engines. The Government has made efforts to hand over the ownership and management responsibilities of water points to the communities throughout Namibia. However, water points were never in full operation and often in the need of repair hampering the handing over of the water points to the community.

Field data reveals that the Topnaar still apply some of their traditional knowledge and livelihood practices, relying mainly on two resources for their livelihoods; namely *Inara* plants and livestock. 35 of the 38 households interviewed were involved in *Inara* harvesting. A total of 92 out of the 174 individuals are involved in harvesting other wild plants (mainly used for medicinal purposes).

The !Nara fruits



The 'pulp'



The !Nara seeds



!Nara harvesting is vital for the Topnaar

The traditional livelihoods of the Topnaar are closely linked to the annual flooding of the Kuiseb river, which ensures that the water table is high enough to sustain its function as a linear oasis. The annual flooding is considered to be vital to the regeneration and survival of !nara (Masaaki 2005). Shilomboleni (1998) reports that conditions for !nara growth have deteriorated over the decades, and crop yields have decreased in recent years. Changes to the flow of the Kuiseb due to building flood protection walls (in 1961) and lowering of the water table and altered climatic patterns could be to blame (Masaaki 2005).

The !nara plant provides food, fluid and income to the Topnaar. In 2005, 40 percent of Topnaar !nara harvesters had no other source of income during the harvesting season (Masaaki 2005). The flesh of the fruit, when cooked into a pulp, can be eaten while the seeds can be baked and salted or pounded into a powder and eaten as porridge, which can 'fill one up for a very long time'. Preparing !nara seeds is a very time consuming process. Once the !nara plants have been harvested, they are buried in sandy soil for about 2-3 days to help with the ripening process. Thereafter, the plant is skinned and the inside cooked into a pulp for 2 to 4 hours. Then, the pulp is spread out on a blanket to dry and the seeds are separated from the rest. What remains is known as "Nama Chocolate". Today, the !nara seeds are mostly sold to an agent, which produces oil and other products from the seeds.

The Topnaar community used to be the only group to harvest !nara in Namibia but there is no statutory legislation to support their claim for exclusive rights to harvest the !nara plants and today more outsiders are entering their area to harvest the !nara. Community members state that outsiders harvest the !nara unsustainably because they damage plants. However, a key informant stated that some Topnaar harvesters are too old to harvest by themselves and therefore they hire Oshiwambo speaking people.

Apart from the *!nara*, several other plants that depend on the seasonal flooding of the river still have significance for Topnaar livelihoods, e.g. the hard wood tree *Acacia erioloba* (camel thorn), which provides shade, firewood and food for wildlife and goats (and for humans in times of extreme drought), while the gum, bark and roots are used medicinally (Van Wyk & Gericke, 2000, Mizuno & Yamagata, 2005). The large *Faidherbia albida* tree, which sheds its leaves and pods annually, provides a vitally important food source for goats, which eat the leaf litter during the dry season.

Livestock (goats, sheep, cattle and donkeys) is important for the Topnaar community in two ways; it provides food security and an income. The average number of livestock per household varies significantly between the different settlements, from 41 in Homeb and Natab 2, to only 1 on average in Armstraat. At the individual level, the average number of livestock per household member is again relatively high in Homeb and Natab 2 (13.7 and 16.4 respectively).

The **Hai | Om** are restricted from practicing most of their traditional livelihood activities in and around their present settlements. In general, an influx of people with their livestock and declining food security in the Hai | om area is likely to result in increased competition over available grazing and bushfood. The most important natural products that are still harvested by Hai | om include: firewood, wood for construction and woodcarvings; thatching grass; medicinal plants and foods (from nuts, fruits, leaves, roots and bark) as well as game which is hunted illegally. Many of the plants that are still gathered are localized and seasonal in their occurrence. Mangetti nuts form an essential part of the staple diet of the Hai | om, but only when available. !no (*Strychnos cocculoides*), |gui (*Guibourtia coleosperma*), ||go (*Grewia falcistipula*), and tsi'xa (*Cucumis* sp.) are also gathered (see Widlok, 1999). Some medical plants are collected on the 10-hectare plots within Tsintabis. Otherwise it was mentioned that one has to travel far to collect bushfood and that access is restricted. The **Tsintsabis** area differs from **Farm Six** in terms of bushfood availability. A variety of

food exist in different areas, depending on the area’s soil type The Tsintsabis area is said to be rocky in some places, while more sandy in others. In some areas (west of river) one needs to dig deeper to find food under the ground. From river to further east: more food than west of river, west of the river, the food is also deeper in the ground and more difficult to get. In recent years the commercial value of some wild products (referred to as Indigenous Natural Products or INPs) has been recognized and developed by several NGOs in Namibia. However, the exploitation of INPs is not occurring in and around Tsintsabis on a commercial basis (ARD 2008 (a)).

Food aid
 Most of the resettled Hai//Om in Tsintsabis receive maize meal and cooking oil every month. At Farm Six too, people are highly dependent on food aid, but they complain that it comes at very irregular intervals – and that they only receive maize meal. They explain that this encourages illegal hunting, because “you cannot eat maize meal without anything” – thus excusing the fact that in the face of no other options, they apply their traditional knowledge on hunting wild game to sustain themselves.

Agriculture in the Tsintsabis area is limited by the hot, dry climate, sandy soils and lack of surface water. Like many other resettlement farms in Namibia, the land that has been given to the Hai||om at Tsintsabis is degraded and bush encroached. During severe drought periods, such as experienced in the early 1990s, agricultural production becomes even more difficult.

The survey data presented below shows the Hai||om’ perceptions of changing importance of key livelihood elements over time. **Figure 12: Hai||om perceptions of importance of livelihood elements in the past**

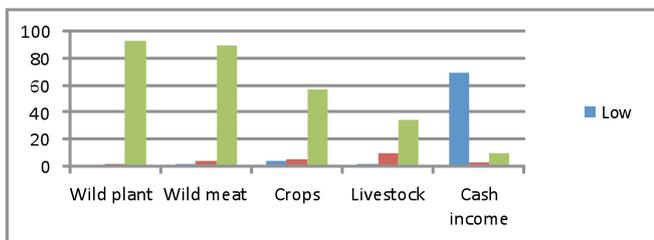
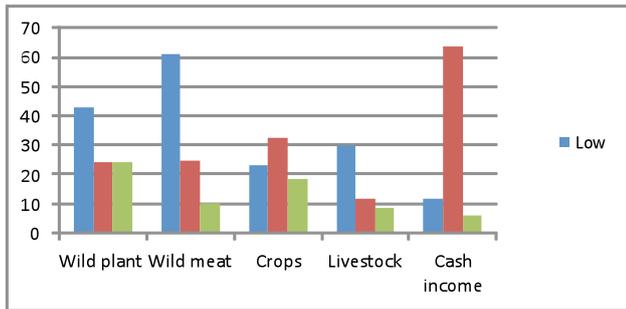


Figure 13: Hai||om perceptions of importance of livelihood elements in the present

Bushfood is fenced off
 At **Farm Six**, the cattle posts which were allocated to the Owambo farmers include areas with valuable bushfood previously gathered by the Hai||om, but which are now off limits to them and fenced off. Hai||om individuals are only allowed to use the area in exchange for casual work they provide to the farmers. Owambo farmers apparently accuse the Hai||om of cattle theft when they enter the area.
 In **Tsintsabis**, the 10 ha plots allocated to individuals do not provide any infrastructure for sustainable gardening or animal husbandry, and thus cannot sustain Hai//Om families. If Hai||om trespass on commercial farms in the vicinity of Tsintsabis to collect firewood, medical plants or bushfood, they risk to be beaten up.



The data clearly reflects the importance of hunting and gathering in the past and the decreasing importance at the present time. Penalties for illegal hunting are strict but due to necessity many poor rural people in Namibia hunt illegally. From the survey, it appears that especially Hai||om at Farm Six still do some hunting of small animals, such as duiker, steenbok, porcupine, tortoise and springhare. With domestic animals present in all areas surrounding the Tsintsabis settlement, some desperate Hai||om resort to stealing and slaughtering livestock.

Bushfood plays a more important role than hunting. The data indicates that the importance of cash income was low in the past, probably referring to a distant past when hunting and gathering were predominant and not necessarily to 1990 when most Hai||om were living on commercial farms. The importance of cash income thus seems to have increased, although only 22 out of the approximately 2000 Hai||om in Tsintsabis and eight out of the approximately 300 at Farm Six, are permanently employed. However, additional field data indicates that access to pensions is regarded as the most important livelihood strategy and food aid as the second, while collection of bushfood is used as a coping strategy the moment there is no maize meal from the Government.

Of the respondents, 57% thought that crop production was important in the past. The reason for this is that the farm workers were allowed to have small gardens close to their homesteads. However, the community does not currently see this as an important strategy, as access to land becomes scarcer and as a result, having a small garden becomes more difficult and less viable. Furthermore, even if households have small gardens, they face difficulties with access to water and cattle destroying crops due to lack of fencing.

The importance of livestock has also changed over time but the high percentage of respondents who answered “don’t know” to this question might be due to the fact, that livestock was never a very important livelihood strategy. However, chicken rearing is seen as an important livelihood strategy while the number of cattle owned by Hai||om is low; the average ownership of cattle in Tsintsabis is only 0.29 percent and 0.78 percent in Farm Six.

The Hai||om maintain that they do not know as much about plants and their usages as their nomadic forefathers did, and their forced sedentary life style has resulted in noticeable environmental degradation in just a few generations (Widlok 1999). In general, field research shows that the Hai||om still preserve valuable traditional knowledge on bushfood and hunting. For example, when asked about which wild plants they harvested, more than 70 different species were mentioned, indicating that valuable traditional knowledge has not yet been lost. At Farm Six, the gathering of wild fruits, bulbs and tubers still constitutes one of the main livelihood strategies, and a wide variety of wild fruits are consumed on a regular basis.

“Sharing is part of our lives, it is in our blood”

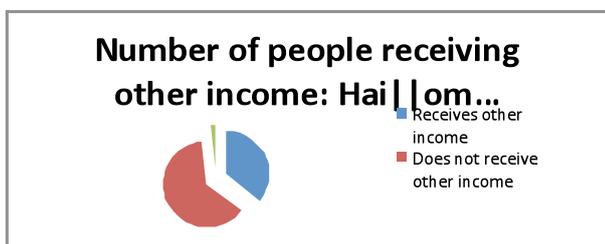
Hai//Om San informant

Sharing of resources has been and still is a core value for the Hai||om. Traditionally, sharing was a livelihood strategy that ensured redistribution of bush food and the Hai||om have various terms for different methods of sharing. The cultural value

of sharing is closely linked to the high mobility that characterizes the Hai||om. If, for example, school children have relatives living closer to the school than their parents, they sometimes move in with them. Likewise, if someone has family ties to a farm worker or other employed individuals, household members might go to visit for an extended period, as this person has more food available. Thus, the cultural value of sharing that has been mentioned in the previous section, is a key factor shaping the current livelihood strategies of the Hai||om : pensions, food aid and cash income from work are shared among all members of the extended family and beyond.

In the survey, 35.5 percent of the Hai||om respondents mentioned that they had “other sources of income” (illustrated in Fig. 14 below). More specifically, these other sources include support from relatives who have some sort of cash income, for example from pensions, piece work, salaried employment, small-scale income generating activities such as production and sale of alcohol, etc.

Figure 14: people receiving other income



Informants reported that those Hai||om who have tried making an income from small businesses rarely have much success, since one cannot refuse to give credit to a community member in need, wherefore earning profits becomes impossible.

Migration rates are comparatively high both in the Topnaar and Hai//Om communities (34 % are non-permanent residents in their respective communities according to field research). This is related to the importance of sharing as a cultural value and a livelihood strategy, as people move around in order to share the resources available in the extended family network.

4.3. Ogiek, Maasai and Turkana livelihoods

The **Maasai** and the **Turkana** are pastoralists, and thus practise the dominant form of livestock keeping in Kenya. It is estimated that nearly 10 million Kenyans in the ASALs derive their livelihoods directly from livestock as pastoralists and small-scale mixed farmers. Pastoralists living in the ASALs hold approximately 70% of the country’s livestock.

Traditionally, **Maasai** livelihoods are closely linked to livestock, especially cattle and goat, which is also the source of their traditional food, comprised of meat, milk and blood. Livestock and livestock products play a major role in their cultural and social life including identity, rituals and marriage. Ownership of livestock also defines one’s economic status and social standing. Their traditional livestock keeping practices have come under immense pressure as a result of economic, social and land use changes. Of particular significance in this regard is the curtailment of livestock mobility as a result of competing land uses, particularly urbanization, farming and conservation.

The **Turkana's** livestock include cattle, goats, camels and donkeys. It is estimated that up to 60% of the population derive their livelihoods from livestock-based activities. In addition to pastoralism, riverine agriculture and fishing are important livelihood strategies for the Turkana. Increasingly frequent and severe climate floods and droughts have translated into persistent emergency situations in Turkana, with famine relief becoming a near permanent feature of the local economy as food security is undermined.

The pressure on pastoralism is confirmed by community perceptions, which indicate that all the communities have seen significant changes in their livestock holdings today when compared with the past. Even discounting for the tendency of communities to romanticize the past and understate their present wealth, these figures depict significant changes in these communities:

Figure 15: Maasai and Turkana community perceptions of livestock holdings in the past

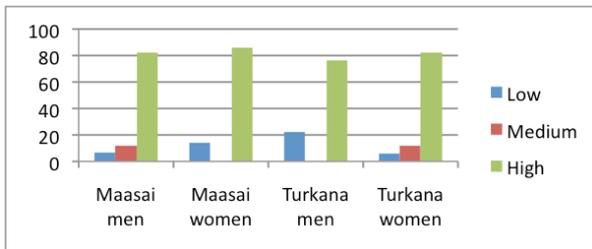
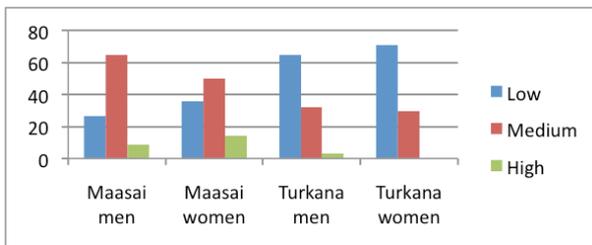


Figure 16: Turkana and Maasai community perceptions of livestock holdings in the present



There is a strong correlation between livestock and income among pastoralists so when asked about household income levels from the past to the present and future, the respondents give a similar picture to that of livestock holdings, with generally higher incomes in the past, moderate incomes at present, and expectations of low incomes in the future. As regards the future, communities are generally pessimistic, with the highest number of respondents expecting low livestock holdings in the future (91% of the Ogiek and 84.2 % of the Turkana). The Maasai appear to be more hopeful about the future with 40.9 % expecting “high livestock holdings” in the future.

The responses concerning current priorities for income and food security, reflect the growing diversification of livelihood strategies. Among the Maasai, herding ranks as the first priority activity for income and food security among men and boys, while farming is the priority activity for women and girls. The second priority is farming across gender lines, but a significant number of women and girls report “other”, which includes petty trading and “merry-go-round” , i.e. women creating mutual support groups through which they pool funds to support the purchases of key household items and even investments. Similar findings

are recorded from the Turkana, with herding as the first priority for men and boys, while farming and “other” take the lead among girls and women respectively. The second priority is fishing for men and boys and ‘other’ for women and girls. Employment does not seem to feature very highly across the three communities.

Figure 17: Maasai, 1st priority for income and food security

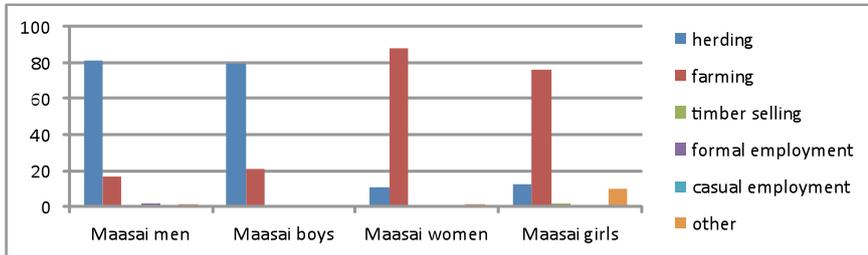


Figure 18: Maasai, 2nd priority for income and food security

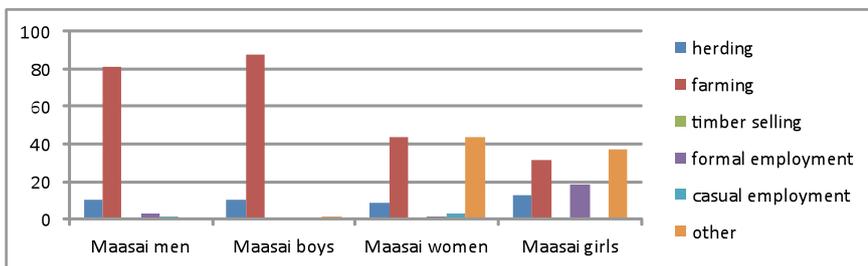


Figure 19: Turkana, 1st priority for income and food security

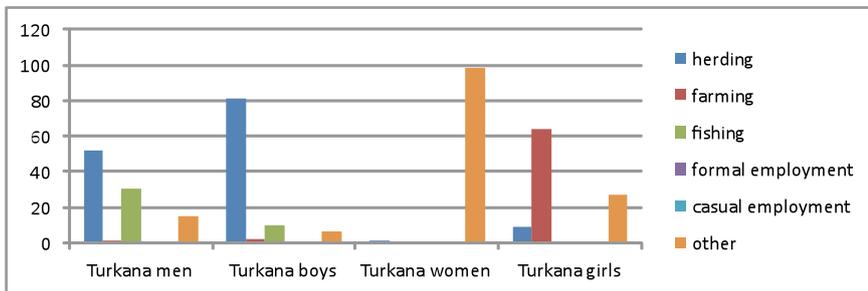
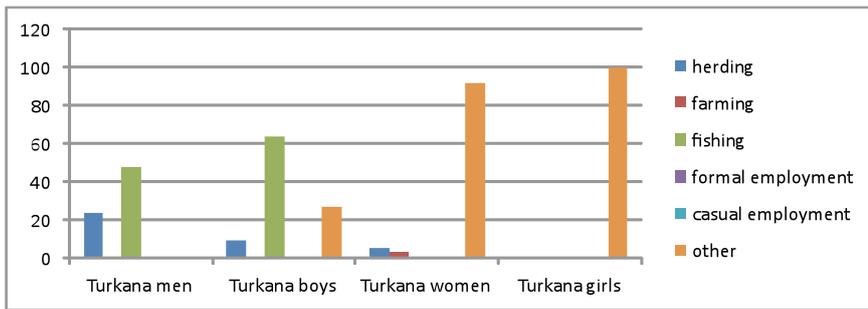


Figure 20: Turkana, 2nd priority for income and food security



The **Ogiek** traditionally relied on forest produce, wild game and honey, but in order to cope with livelihood challenges they have diversified their household economies. Asked to name their first priority for income and food security, the Ogiek listed farming across gender lines. For the second priority, men and boys listed herding, while the women and girls listed casual employment. The traditional livelihood pursuits of hunting and gathering do not appear in the list, but men and boys list honey trading as the third priority activity for income and food security. The farm produce is consumed locally, but is also sold to raise income for other household needs. A significant number, especially women, work as casual laborers. Some are engaged in trade and service provision in local markets.

Figure 21: Ogiek, 1st priority for income and food security

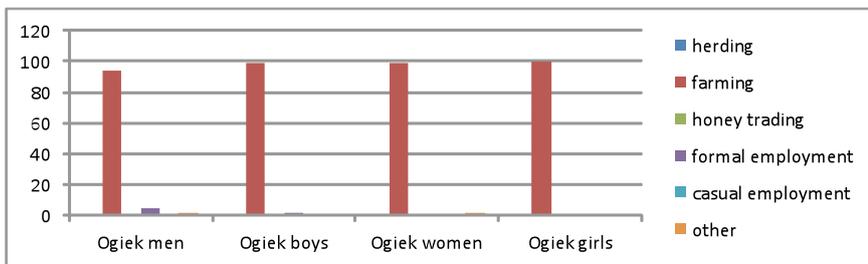
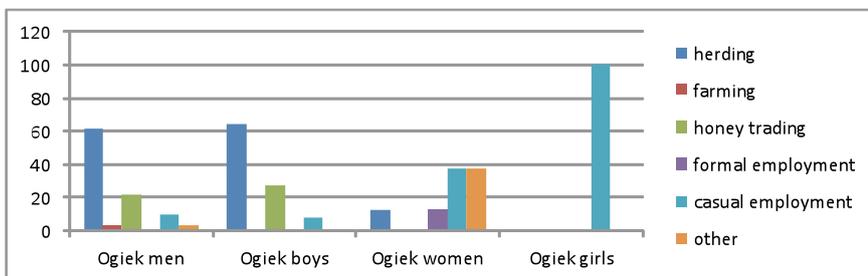


Figure 22: Ogiek, 2nd priority for income and food security



Respondents reported an increase in outright migration from their original areas to settle elsewhere. The main

cause of migration was indicated as drought, which leads to loss of livestock, forcing pastoralists to move in search of water and pasture. Some respondents reported migrating as agricultural land uses increased in their areas, restricting access to land for grazing. Others migrated in search of employment and alternative means of livelihoods especially in the towns after they or their families lost all their livestock as a result of drought. Yet others, especially the youth migrate to go to school. Data from the Turkana community indicates that migration is mainly to “very far” destinations.

Figure 23: Percentage of households, specifying number of household members who have migrated.

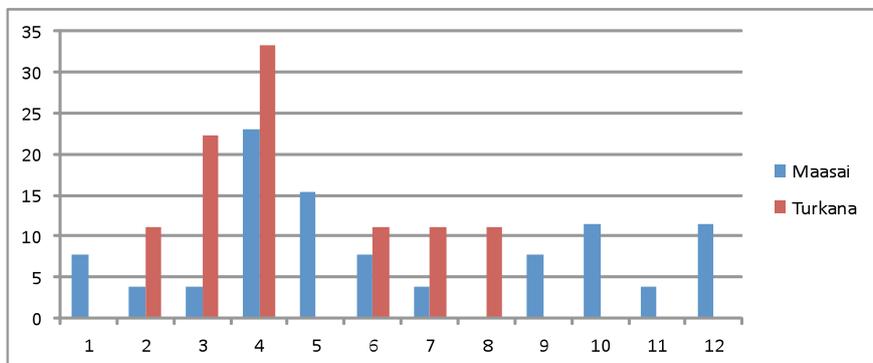


Fig. 24: Turkana: migration distances

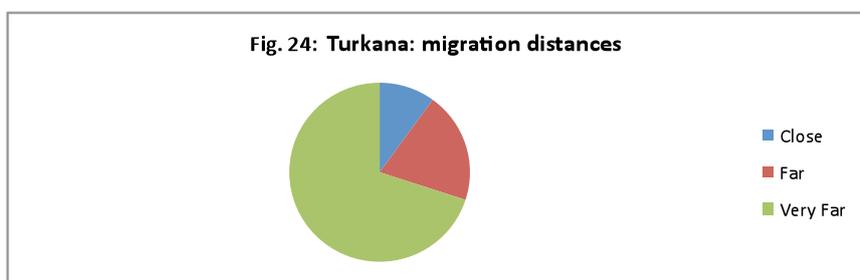
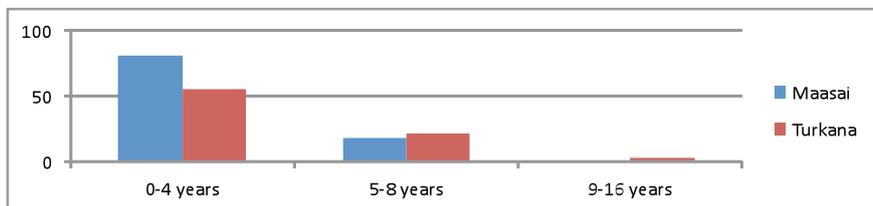


Figure 25: years since migration



4.4. Summarizing characteristics of the communities complex livelihood strategies

All of the communities have traditionally practised hunting, gathering, fishing or pastoralism, which require mobility and flexibility and, consequently, access to land and natural resources. Currently, all the communities face imposed restrictions on their access to lands and resources, pressure to increase sedentarization as well as criminalization of certain traditional practices. Another general tendency is the added pressure, stemming from increased and unsustainable use of natural resources by more dominant groups and, particularly in the case of Kenya, conflict over scarce resources. In particular among the pastoralists in Kenya, there are indications of high out-migration rates, reflecting an unsustainable pressure on local resources.

All communities continue, to varying degrees, to be dependent upon traditional livelihood elements, also in the absence of viable alternatives. In this context, cultural values related to, for example, mobility and sharing with the extended family constitute key resources that the communities can draw on, even in a contemporary context of migration, self-help groups and government subsidies. This also implies that key elements of traditional knowledge and cultural values are still maintained and passed on although it must be assumed that the decreasing importance of traditional livelihoods and rapid changes will eventually erode values and knowledge related to the environment. Where changes are taking place at a slower pace, and does not lead to disruption, it allows indigenous communities to gradually incorporate new livelihood elements and make use of emerging opportunities in terms of tools and practices.

All of the communities face difficulties in supplementing traditional livelihoods with decent work opportunities and are thus vulnerable to accepting poor labor conditions. Further, none of the communities have accessed support for development of long-term sustainable and diverse livelihood strategies. Instead, where government support is provided, it is often in the forms of pensions and food aid, which barely contribute to cover a subsistence minimum. This may be one of the reasons for the pessimism regarding future livelihood prospects, expressed by many of the communities.

Dell 4/12/12 17:25

Comment: Dette burde modereres ifht. støtte til støtte til Mau og irrigated agriculture i Turkana

5. Impact of climate change and variability on indigenous peoples in the sub-region

When discussing indigenous peoples' perceptions of climate change and related impacts, it is important to keep in mind that indigenous peoples' cultural notions of climate and perceptions of causal relationships are distinct – and may be very different from those applied by climate change scientists. Therefore, it has generally been a challenge for the researchers to directly relate and compare the perceptions and experiences of the indigenous communities participating in this study with, for example, the climate change phenomenon and first order impacts identified through the literature review.

The Hai|Om concepts of 'drought' are a case in point. In the local language there are three terms for droughts, but after explaining the English term, the community agreed that '|khurub' should be used. This term means "hunger" or "no food" and is not only related to a lack of rain or dry environment but immediately also includes the impact on the community. One of the Hai//Om community members remembered a time when droughts were severe and breast feeding women died due to lack of food and

water. During those times, people were only dependent upon bushfood and game, but nowadays they rely on food aid from the government as well. Therefore, droughts are not felt so badly these days. However, if the Government stops this aid, the |khurub' would come back.

The difficulties of directly relating the concept of |khurub with the concept of drought is evident, as the climate phenomenon and its social impact are inseparable. This, for example, is also the case for the Turkana and Maasai, where drought and famine are considered jointly in community perceptions of climate change hazards. Among the Ogiek, climate change is interpreted as the consequence of deforestation in their local environment. These examples illustrate the difficulties in directly comparing indigenous and scientific knowledge regarding climate change. Further, isolating the impact of climate change from the multiple pressures experienced by the indigenous communities was a major challenge for all research teams.

5.1. Community perceptions of climate change phenomena

As mentioned in section 1.2., it was only in **Kenya** that the concerned communities had a concept of “climate change” that the researchers could refer to. This may be due to several factors, including the severe and direct impact of climate change on pastoralist livelihoods and the existence of indigenous organizations that are participating in climate-related discussions at international and national levels.

Members of the three Kenyan communities perceive climate change through impacts that they note in their environment and the natural resources that they depend on for their livelihoods. The key changes that they have noted in this regard include: more frequent and severe droughts and floods; drying up of rivers, swamps and wetlands; changing rainfall patterns; increased occurrence of frost; diminished soil fertility; and escalation of pests and diseases. Some of these phenomena are clearly inter-related, for instance droughts and the drying up of rivers, swamps and wetlands. Climate change has interrupted the rhythm of seasons resulting in unpredictable rainfall patterns. For the communities, the change in weather patterns is most starkly demonstrated by the reality of drought, which in the past occurred roughly once in a decade, but is now experienced virtually every second year, and for longer periods at a time.

When asked about the two most recent climate change-related hazards experienced, the answers strongly reflected the predominance of drought and famine, followed by pest and diseases among the Turkana and floods among the Ogiek and Maasai.

Fig. 26: Community perceptions, most recent climate change-related hazard

A major concern of **climate related traditional knowledge** is the prediction of rains and drought. Respondents reported that elders observe the sun, the moon, and the stars to foretell the onset of seasons. The appearance and behavior of certain species of animals, insects and birds, including their singing and whistling, are used to determine the onset of rains or drought. For instance the croaking of frogs in rivers is a sign that the rains are due. The migration of Flamingos from South to North signals the onset of the dry season. Spiritual leaders, diviners and prophets advise communities on weather patterns, signaling the onset of rains or droughts. The movement and direction of clouds and winds are used by elders to determine the coming of the rainy season. Elders also observe the sun in the morning and can tell on the basis of cloud formations around it that the rains are due.

Pastoralists also observe the behavior of their livestock and use it to establish weather patterns. For instance, among the Maasai it was reported that when cows face the West with their tails up, that shows that rains are about to start. When cattle excrete while lying down, it is a sign that droughts is ahead. Elders are also able to tell weather patterns from the nature of dung that cows produce. They also study the intestines of livestock that is slaughtered and are able to predict the coming of rains or drought.

Not being able to predict the timing of rain and drought or the quantity and severity undermines the capacity of indigenous peoples to plan their production and other activities, leaving them literally at the mercy of the elements.

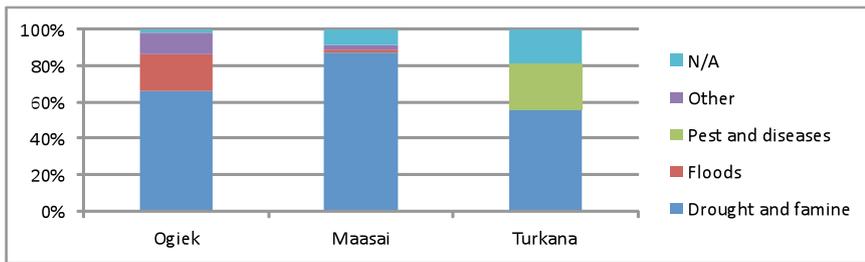
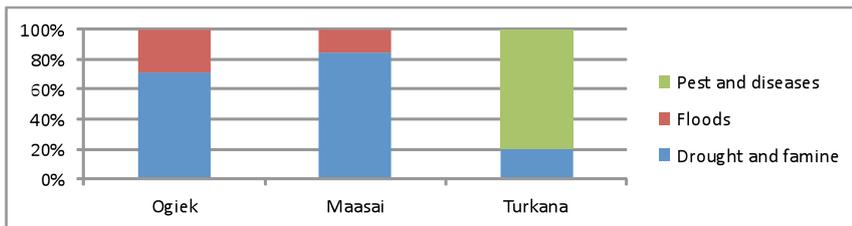


Fig. 27: Community perceptions, second-most recent climate change-related hazard



Frost was only reported by the **Maasai** of Naivasha who identified it as an emerging manifestation of climate change. The respondents averred that recent years have seen an increase in the period of severe cold accompanied by frost. Unlike in the past, temperatures at night get extremely cold and the dew turns into ice. In the mornings, grasses and plants are scorched with the frost and livestock have to be kept at home well into the morning when the sun has warmed up the land. Frost affects the quality of pastures and the health of vegetation and crops. Communities also associated frost with an increase of diseases for both humans and livestock and reduced soil fertility. During these periods, children are unable to travel to schools in the morning, which affects their performance. It was also reported that exposure to the low temperatures darkened their faces giving them an unusually dark hue.

For the **Ogiek**, climate change is closely linked to deforestation, which they blame for drought and other climate related hazards. The Ogiek also stressed changes in temperature much more than the other two communities. Respondents from the community reported increasing temperatures, which they say has affected productivity of the land and impacted adversely on human health.

The communities in **Namibia and Congo** did not have prior knowledge of the concept of climate change, but were able to readily identify environmental changes that have occurred in the past 20 years, although they were not able to associate these with either global climate change or local environmental pressure. The research team in **Boucy Boucy** in **Congo** decided to focus on “environmental changes” in exercises with the community, and later analyse the findings and draw links to potential climate change impacts. The six main environmental changes identified by the **Boucy Boucy** community are summarised below.

List of environmental changes observed by Boucy Boucy in order of importance:

Overall ranking	Environmental change observed	Ranking by	Ranking by	Link to climate change

		men	women	
1	Water pollution	2	1	Indirect
2	Impoverished forest	3	3	Potential in part
=3	Temperature increase	5	2	Direct
=3	Deforestation	1	6	Potential in part
=3	Increasing rarity of medicinal plants	3	4	Potential
6	Drying up of rivers	6	5	Direct

The observed changes of increased temperature, drying up of rivers and water pollution can be linked to climate change. The drying of rivers restricts access to water and water resources such as fish or certain plants that grow on river banks. The increasing rarity of medicinal plants, less abundant resources available in the forest, and deforestation may potentially, at least in part, be linked to climate change if medicinal plants, animal and vegetable forest resources used and certain species of trees were not adapted to increased temperature and reduced rainfall conditions. It would, however, require a major study to identify the species in question and their susceptibility to climate change. These changes may also be caused in part by local environmental pressures, but the research team observed that the manner in which medicinal plants were gathered did not harm the plant (for example, by cutting off a small section of bark or a few leaves from a tree).

Figure 28: The seasonal calendar exercise and its result, Boucy Boucy



Photo credits: Nathaniel Dyer, Rainforest Foundation UK

Communities also clearly identified changes in the length of seasons, specifically that in the past the rainy season was longer and the dry season shorter, but now the dry season has got longer and is the same length as the rainy season. This reduction in rainfall was seen in the drying up of rivers and water pollution (as ground water in the forest 'runs' for less time in the year and becomes stagnant and polluted). Both this reduced rainfall and increased temperature fits with available meteorological data for the Republic of Congo. In **Ngonaka**, the

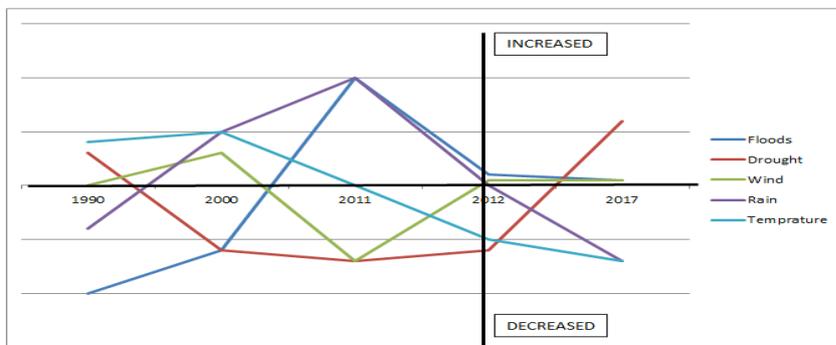
Ngonaka reported disruption of the seasons, resulting in unpredictable periods of rain and drought. In the past, communities had a clear timetable of activities that were linked to the rainy and dry seasons. But now, they consider that the seasons no longer obey any periodicity and rainy seasons have become rare. Moreover, these rains have become scarce and more violent and are accompanied by strong winds that sometimes cause damage. The longer dry seasons are also characterized by higher temperatures.

disruption of the seasons and the increased temperature are the main signs of climate change observed by the community, along with less frequent and heavier rains and stronger wind.

The trend line below shows the **Topnaar's** perceptions and projections of changes over time (only relations and not absolute numbers) with regards to floods, droughts, wind, rain and temperature.

Figure 29:

FIGURE 7: Trend Line on Climate Change related hazards: perception of the Kuiseb River Topnaar Community



The Gobabeb Research and Training Centre’s recording of annual rainfall confirms that rain has increased since 2006 for most of the years, with heavy rains in 2011. Also, the community perceptions of an increase in floods from 1990-2000 and the major flood in 2011 are confirmed by the Gobabeb Centre. The community has never experienced this kind of flooding before in their lives. In the coming five years (2012-17), the community assumed that the number of floods as well as the rains will reduce. Thus, a relationship between droughts and floods was seen by the community. According to the Topnaar community, winds increase when floods are less. The line for temperature states that between 1990 and 2000, the temperature stayed more or less the same and that it decreased from 2000 onwards. Cold temperatures are preferred by the community since they have more energy to work. The Topnaar community assume that the temperature will decrease in the future. However, the literature reviewed indicates that it is most likely that the temperature will rise.

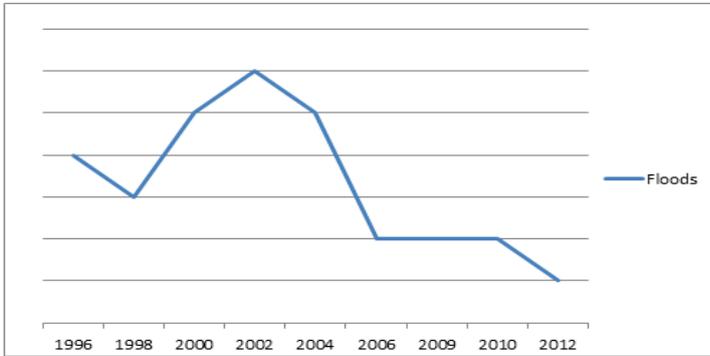
The most important impact identified by the **Hai|om community** regarding climate change was the irregularity of rain with its negative impact on bushfood: ‘when the plants need rain, they get sun [instead]’. According to the community the rains have decreased and the rainy season is starting and ending later, with the result that the plants produce less food or the food gets rotten. In former times heavy winds would start in August and flies would disappear and weeds would start growing. The normal rains would come later in the year (around November and December). The rains would normally stop around April. However, these days the rain stops later than usual (May or even June) with the result that some of the bushfood (e.g. Grewia berries) rots when they ripen. In normal winters, there might be frost but in 2011, there was a severe frost, reported as the worst frost ever.

Occasionally the Hai|om area receives heavy rains, which results in floods. The floods that the community could remember were the floods in 2000, 2004, 2006, 2009, 2011 and 2012. The largest flood that people

could remember was the one in 1973. The graph below was made by the community, remembering the heights of the floods by using measurements like, 'up to the neck of a cattle', 'the hip of a woman' or 'the third wire of the fence'. In 2012 there was a flood, but this was most likely caused by the construction of pipes and a bridge.

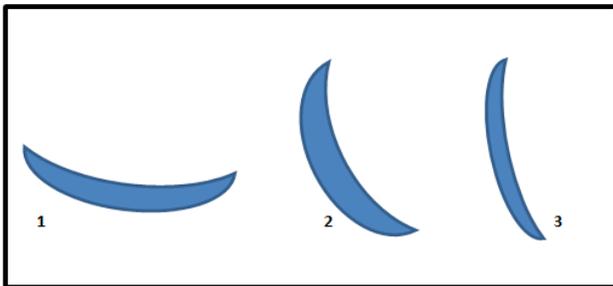
Figure 30:

Trend line on Floods: Local Perception of the Hai | |om community in Tsintsabis



The Hai | |om has different beliefs regarding why and when rainy seasons are changing. For example, it was said that in the past you could see frost on the grass at the end of the rainy season, but you don't see this anymore. This might be the reason that the rain continues. Moreover, when the #Naob bird (Hamerkop) goes into the bush and makes a special sound it calls the rain. Lastly, the Hai | |om community look at the moon to see what will happen in the next season. When it is half-moon, there will be no rain in the season (1), when it is half-moon but one side is higher, the rain will start (2) and when the left side is even higher, it will be a sign of death (3).

Figure 31: Position of the moon: perception of the Hai | |om



5.2. Key impacts of climate change on community livelihoods and well-being

Rainfall patterns and their predictability are critical factors for the indigenous communities, given their dependence on the rhythm of seasons to determine the schedule for production as well as other aspects of life, including social and cultural events.

In **Kenya**, droughts are the most significant and widespread manifestation of climate change perceived by the indigenous communities, given the impact of droughts on production systems that are based on the use of natural resources. Droughts have a direct impact on the availability and quality of water and vegetation as well as the flow of rivers that feed into lakes. This directly impacts on availability and quality of pastures, wild game and fish. The majority of the respondents attributed changes in livestock holdings, income levels and availability of fish to climate change, thus indicating that they consider climate change a phenomenon that has a major impact on their lives. Not surprisingly, given the fact that the Turkana region has experienced the heaviest droughts as compared to other regions, a larger proportion of the Turkana blame climate change for changes in livestock holdings than members of the other two communities. The position of the Ogiek is at variance with that of the other two communities and may be explained by the fact that livestock does not constitute such a major component of their livelihoods. Further, living in the forest, the Ogiek may have been better cushioned against the vagaries of climate change.

Fig. 32: Turkana community perceptions:

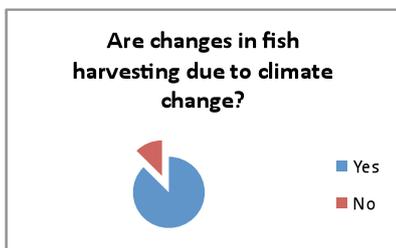
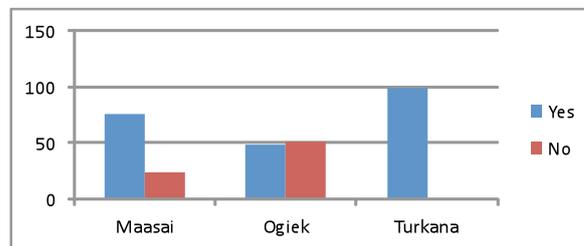
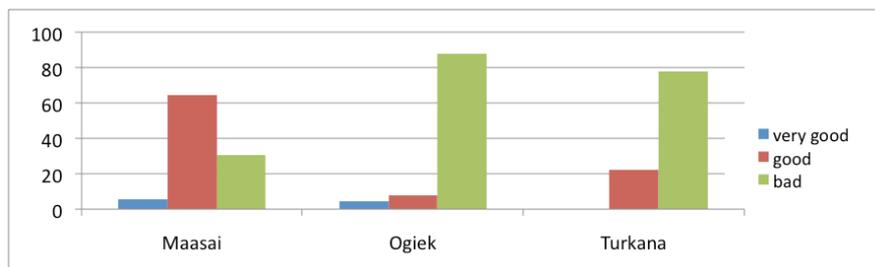


Fig. 33: Community perceptions: is climate change to blame for changes in livestock holdings?



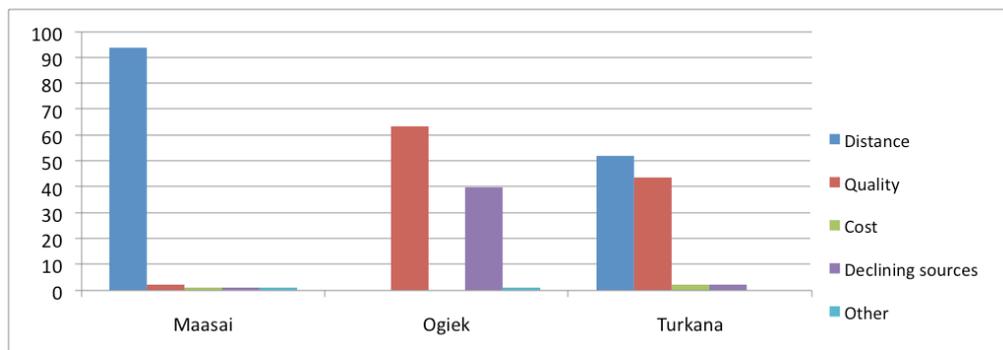
Severe water shortages is one of the key climate change impacts predicted for Kenya, and access to water is noted as a major problem across **the Maasai, Ogiek and Turkana** communities, with 81.5 % of the respondents indicating that access to water has changed over time. When asked to indicate whether their access to water is 'very good', 'good' or 'bad', the vast majority of respondents stated that they had 'bad' access to water.

Figure 34: Community perceptions regarding access to water



When asked what had changed, distance was indicated as the most significant change especially by female respondents among the Maasai and Turkana, who have to travel increasingly longer distances to water points. During periods of severe shortages, they have to leave their homes before dawn and only return after dusk, meaning a whole day of walking to and from the water point. In the process, women experience severe exhaustion and are exposed to other threats that include sexual assault and even attacks by wild animals. As a result of carrying the load of water on their backs over such long distance and time, women suffer back pains and other health problems. Furthermore, young girls are forced to abandon school so as to assist in collecting water for their families or taking care of their siblings as their mothers go in search of water. The other most significant changes noted relate to quality of water (Ogiek and Turkana) and declining water sources (Ogiek).

Fig. 35: Community perceptions of access to water – what has changed?



Turkana is probably the place most associated with drought in Kenya. Most households have few or no livestock, yet cultivation is not an option save for those who along River Turkwel, which is increasingly drying up. The Turkana who were involved in this study confirmed this, reporting that drought and famine have virtually become permanent features of the Turkana landscape. Respondents asserted that over a couple of decades periodic droughts have combined with insecurity and diseases to decimate livestock herds in the region to levels, causing as high as 90% losses of livestock in some areas, triggering humanitarian crises, famines and loss of lives. The droughts have had equally devastating effects on fish catches in Lake Turkana, which have dwindled over time depriving the community of an alternative source of food and income that in the past cushioned them against the impacts of livestock losses. There was general agreement that the frequency and severity of droughts in Turkana has increased to levels unheard of in the past. Drought is also blamed for exacerbating conflict between the Turkana and neighbouring communities. Cattle raids are frequent, especially during periods of drought, with the Turkana suffering attacks from the Merile of Ethiopia in the North and the Pokot of Kenya in the South. The raids increase when the Turkana are forced by drought to move nearer to these neighbouring communities in search of pasture. Traditional enmities have escalated as a result of the ready availability of small arms and the commercialization of cattle raids by cartels that use the method to collect livestock for sale to markets in Nairobi and other commercial centres. Floods are the flipside

- Impacts of droughts**
- Diminished availability of pastures, game and fish and other aquatic life
 - Deterioration of human and livestock health (poor nutrition)
 - Death of livestock
 - Famine and destitution
 - Deforestation
 - Reduced soil fertility and productivity
 - Conflicts over access to water and pastures
 - Migration in search of pastures, etc
 - Children drop out of school
 - Drying up of rivers, lakes, swamps and wetlands
 - Loss of medicinal plants and herbs

of droughts, and their impacts are just as devastating. Floods wash away livestock, and bring about an increase of water-borne diseases that adversely affect the health of both humans and livestock and reduce productivity. The run-off causes soil degradation, while also destroying infrastructure and thus impacting on communications and access to markets. In Turkana, in addition to these adverse impacts, floods make it possible for the local population to engage in riverine agriculture, and it also improves the availability of fish in Lake Turkana.

Droughts have resulted in significant reduction of herd sizes among the **Maasai**, with many families no longer having enough livestock to support their livelihoods. The Maasai also complained about increasing difficulties in accessing herbs and medicinal plants, and practicing bee keeping, which they attributed to climate change generally and deforestation in particular. For a community with a rich heritage of indigenous knowledge on medicinal plants, which are used extensively in the treatment of human and livestock diseases, this is a major concern. They reported that they now have to travel long distances to purchase herbs and medicinal plants which were traditionally readily available in the area. In the same vein, the community reports that they are no longer able to practise bee keeping and have difficulty accessing honey, which is used extensively in social and ritual functions and as medicine.

All of the communities in Kenya, indicated high access to traditional medicine (87.5 % among Turkana and 100% among Maasai) but also reported declining access to medicinal plants.

Fig. 36: Community perceptions: access to traditional health

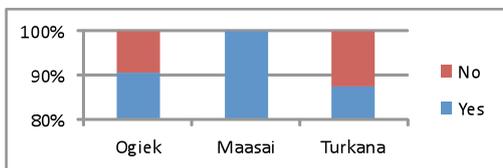
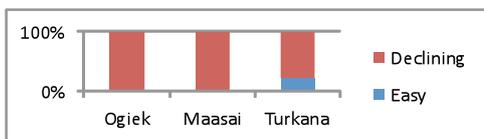


Fig. 37: Community perceptions: access to medicinal plants



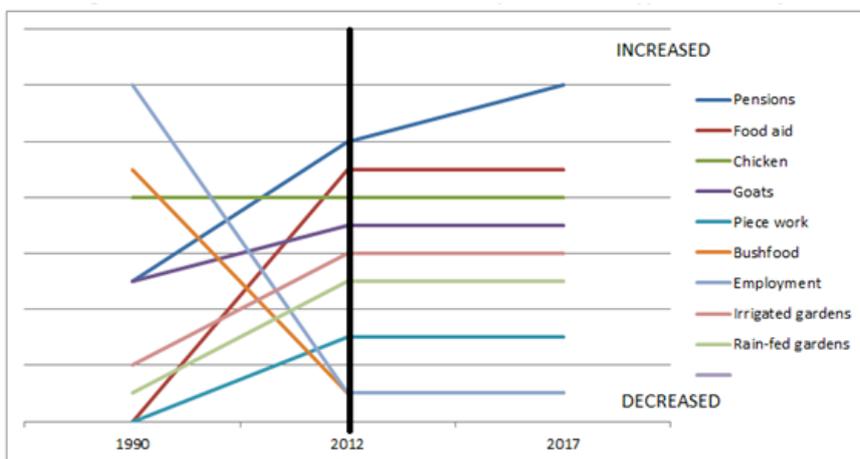
Ogiek farmers are facing problems with mounting soil infertility. Farmers noted that this is as a result of increasingly experienced floods that deplete rich top layer soils. The floods were attributed to increased down flows and dwindling vegetation cover. As a result, farmers are increasingly using fertilizer and hybrid seeds, which increase the cost of production. The Ogiek also keep livestock and few have work as salaried employees. The Ogiek tend to blame human interference more than climate change for changes in their livelihoods. Forest depletion has not been because of climate change but because of deforestation caused by inappropriate management practices, and in particular indiscriminate appropriation of forest land to individuals for settlement and farming. Respondents among the Ogiek commonly complained that “the power saw has been the number one enemy of the Ogiek”. Rather, for the Ogiek, climate change is closely

linked to deforestation, which they blame for drought and other climate related hazards. Consequently, in contrast to the Maasai and Turkana, only 55.8% of Ogiek respondents attributed changes in income levels to climate change underlining that the problems that they have faced in accessing the forest and forest resources critical to their livelihoods have more to do with poor governance, and interference with their management systems.

It is difficult to discuss climate change impacts on the livelihoods of Hai | om communities as, undoubtedly, the lack of access to land is seen as the major cause of poverty. However, the communities pointed out that the disruption of the seasonal calendar and the decrease in rains result in the plants producing less food or the food gets rotten. Another reported impact of increased floods is the sicknesses (parasites, worms) that come with it, and the breeding place for mosquitoes it leaves behind (Tarr, 1999). During times of floods 'slangkop' grows, which is a threat for livestock since it is a poisonous plant. It was reported that the normal frost only kills the branches, and the plants soon recovered again, but that the severe frost in 2011 also killed shrubs/trees/other plants, including most of the sweet berries.

The figure below presents a trend line for the most important livelihood strategies. For 2012-17, there are no expected changes, except for pensions, because the community did not have hope for the future, nor did they see ways to improve their lives.

Figure 39: Trend line of Livelihood activities: Perception of the Hai | om community



When correlating with other data, it becomes evident, that the trends regarding importance of livelihood strategies over time are mainly induced by changes in the political system, especially with regards to access to land, the introduction of new labour laws, and the provision of welfare services. For example, the availability of bushfood is mainly influenced by the limited access to land and not by climate change. Up to Independence, employment (mostly farm work) was the most important livelihood strategy. The farm workers could still collect bushfood and some farmers allowed them to hunt for their own consumption, to keep chicken and a few goats, and to have small gardens. Elderly people were getting pensions but those were not as important as today, because the employment opportunities were better.

Both Boucy Boucy and Ngonaka communities are almost exclusively reliant on income derived from hunting and gathering activities in the forest. Therefore, any climate or environmental changes are likely to have direct and major economic impacts. It was reported that people must travel further and further into the forest to find bushmeat or wild plants. In the past, hunting and gathering sites were “close to the village” (“about 30 minutes” for some resources) while today hunting areas are located more than a day’s walk away. Climate change may be a contributing factor to this trend. For example, people note that caterpillars, which are a major source of animal protein for indigenous people, have disappeared in the area of Ngonaka, and that consequently the quality of living has deteriorated. More energy and time is required for hunting and gathering activities for the same return. The scarcity and remoteness of resources have a negative impact on the amount of forest products that communities can collect and sell. However, more research would be needed to see to what extent there is a link between climate change and the disappearance of caterpillars or other animal and plant resources from the forest, or whether this is mainly attributed to forest degradation caused by other factors. The graphs below show that the gathering of wild meat and wild plants has declined severely, and communities believe that they will continue to decline. In comparison, fish and especially crops, have also declined but not as sharply as traditional hunting and gathering products. Livestock also declined rapidly – community members in Boucy Boucy mentioned a disease, which had killed many of their chickens a few years before.

Figure 40: Community perception of abundance of fish, wild meat and wild plants over time

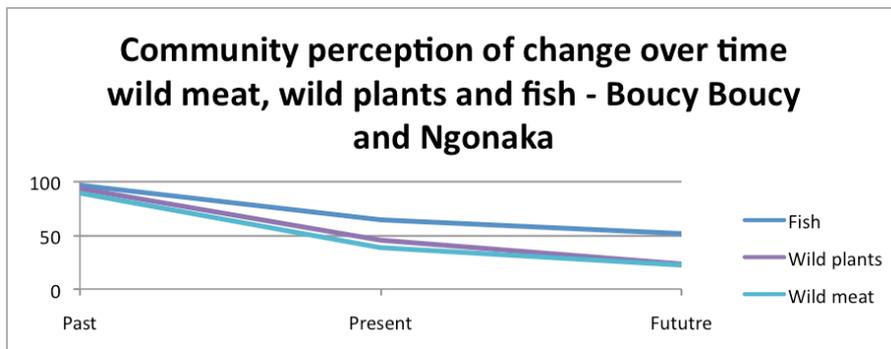
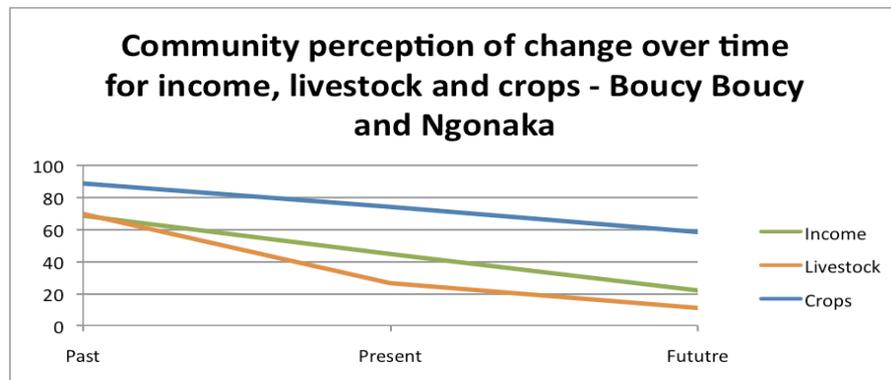


Figure 41: Community perception of income and abundance of livestock and crops over time



The primary social impact of climate change relates to deteriorating health. The **Boucy Boucy** community noted that the indigenous community's health declined from "medium" to "bad" in the period 1992 to 2012 in the trend lines exercise (see below). The prolonged dry season and reduced rainfall have led to streams in the forest flowing for shorter periods in the year and when stagnant tend to breed bacteria and become polluted leading to diarrhoea, vomiting and occasionally death. Stagnant ponds are also ideal breeding ground for malaria carrying mosquitoes. This also shows that there may be a direct link between 'health of the village' and climate change. Staff at the health centre in **Ngonaka** confirmed that water pollution has already caused an increase in skin and digestive diseases.

Figure 42: Results of the trends lines exercise, Boucy Boucy

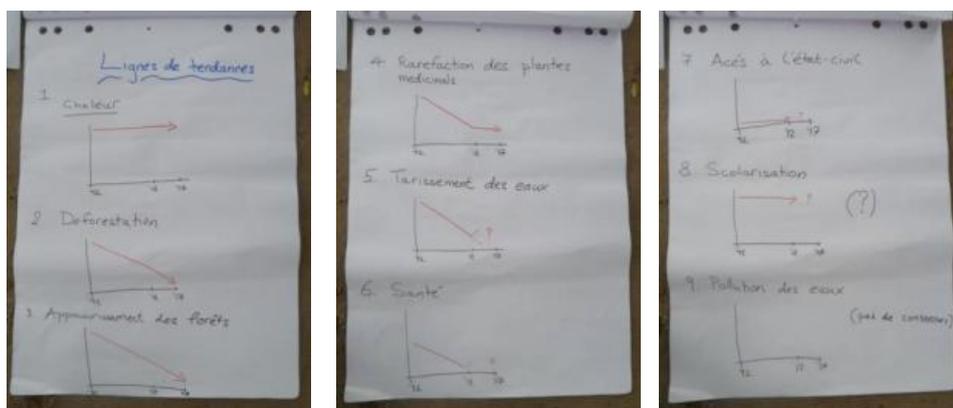


Photo credit: Nathaniel Dyer, Rainforest Foundation UK

Key: 1- temperature; 2 – deforestation; 3 – abundance of forest resources; 4 – abundance of medicinal plants; 5 – drying up of rivers; 6 – health of community members; 7 – access to state services; 8 – school enrolment; 9 – water pollution.

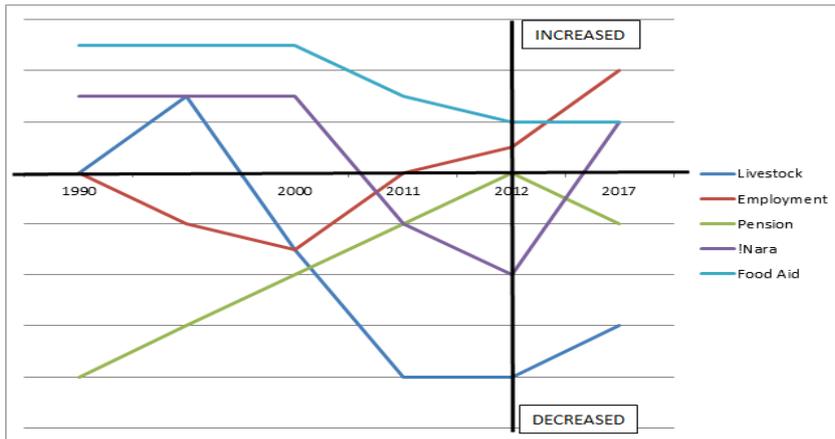
The research indicates that increased temperatures also play a role in decreasing health outcomes, but further research would be needed to confirm this. The literature reviewed suggests that one of the key impacts is increased prevalence of disease/malaria due to rising temperatures heightening the conditions for transmissible diseases, particularly malaria (Tanser et al 2003). The increasing rarity of medicinal plants – such as 'Mbako' the bark of a tree which is used like quinine against malaria – has health implications, as does the reduced availability of plant and animal resources from the forests. Both communities reported that some diseases cannot be treated traditionally anymore, leading to a greater dependence of the community on modern medicine, which is expensive and often leaves community members indebted. As discussed above, it is not clear whether these changes are linked directly to climate change, but it is a crucial issue to investigate further.

Finally, the drying of rivers leads to lower water collection points. This scarcity of access points to water causes many conflicts with local people who don't want to share water sources with indigenous people, who have had to opt for digging their wells. **Boucy Boucy** reported that the drying up of rivers can have positive or negative impacts on fishing activities depending on its scale. When the water level diminishes to a certain level, fishing yields tend to increase as fish are more exposed and easier to catch, but when the water level gets too low they

are unable to fish at all. In **Ngonaka**, anecdotal evidence points to climate change negatively impacting agriculture: “the agricultural production is less abundant”, “the heavy rains can destroy the crops” is reported by indigenous peoples. This is supported by research that suggests that African agriculture, being primarily rainfed, is particularly susceptible to climate change (Mendelsohn, 2000).

In **Figure 43** below, the changes in livelihoods, as perceived by the **Topnaar** community members, are illustrated.

FIGURE 8: Trend line on Livelihood Activities: perception of the Kuiseb River Topnaar community



Some relations between environmental issues and livelihood strategies can be detected but most of the changes are caused by non-climatic drivers of change (e.g. access to education and employment, and opportunities to sell !nara seeds).

The Topnaar community has been living in an arid-area for possibly centuries and adapted to this situation. However, due to heavy rainfall and floods their livelihood opportunities have become more unpredictable. Their high dependability on !nara plants and livestock makes them vulnerable to floods. On the one hand, floods might benefit the production of !nara plants that grow on the southern bank (away from the river), but on the other hand, the !nara fields, as well as the pods from other trees in the riverbed, are highly affected by the floods; they are either washed away or get rotten because of too much water. The importance of livestock increased in the period from 1990 to 2000. During this period, the Government gave a lot of food aid and the Topnaar community was under little pressure to sell their livestock to obtain an income. However, from 2000, the importance of livestock is decreasing because of the floods (e.g. livestock drowning). It was alleged that the importance and number of livestock can only increase when there is more employment or pension income and when there are less predator attacks. The attacks usually take place towards the end of the year when it is driest and goats give birth and are more vulnerable to predators. In addition, the community experienced high number of predator attacks during the 2011 floods. The community explained that jackals often feed on the !nara plants that were washed away by the floods and the jackals had to look for alternative food sources. In 1990, there were strong east winds

affecting livelihoods. For example, people could not leave their houses, could not cook outside and the wind damaged plants and gardens. However, the positive impact of strong winds is that it blows down the pods from trees, which are used for fodder for animals.

Also, employment has been an important livelihood activity right after the floods (2011) due to temporary casual work (fixing fences, etc.). The Topnaar community argued that the employment opportunities will rise if more floods occur because government would need the local community to assist them to repair infrastructure damaged by floods. Other important livelihood activities that are not directly affected by climate change are pensions and food aid. Pensions are highly important because they assist the families every month with paying children’s school fees and other monetary expenses. However, pensions are perceived to become less significant because elderly people die and the younger people are not eligible to receive pensions. Food aid has become important only after Independence in 1990. However, in 2000 the support dropped because of stricter requirements. Food aid increased again in 2011 because of the floods.

5.2.1. The impact of the 2011 flood on the Topnaar community and related coping strategies

The 2011 flood illustrates the impact of climate change on Topnaar livelihoods. When the river started to flow, the Topnaar community rejoiced because the area had not received a lot of rain for a long time. However, as the river continued to flow, they got worried about their livestock and houses. It was not only the Kuiseb River that was flowing, but also the small rivers draining rain water from the nearby Namib plains.



Flood of Kuiseb River in 2011

Impact of floods in 2011: Perception of the Kuiseb River Topnaar Community

Positive impact	Negative impact
The !nara bushes gave more fruits	!Nara plants get washed away
Good grazing areas along the gravels roads	Limited movement of livestock due to predators
	Limited access to the Ana tree (<i>Faidherbia albida</i>) pods, used as animal fodder
Good for the gardens when it rains	!Nara will rot if too much water
Water level is rising (replenish water level)	Roofs were leaking because of all the rain
	Loss of livestock
	Inaccessibility of roads
	Fire wood for cooking is always wet
	Occurrence of worms that are eaten by the livestock and as a result they get sick
	Lightening can kill the livestock (that comes together with rain and the smell of the

	seeds attracts the lightning).
	Trees in the river bed get uprooted
	Waterpoints destroyed
	Children developed diseases from playing in the river
	Mosquitoes occurred in this area for the first time

If floods occur annually and are not extensive as in 2011, it will imply good !nara harvests but also has negative impacts as the Topnaar are forced to move their houses away from the riverbed. If floods occur more frequently, the trees in the riverbed will not have enough time to recover and more invasive grasses will grow. If no floods occur, it will have a negative impact as the water levels of Kuiseb will decline (Turpie et al, 2010). This will have implications for the area’s biodiversity and the Topnaar survival methods since the large trees provide shade and fodder for their goats. According to the Topnaar community, “Fewer floods will lead to [the production of] less seeds for our livestock - since the water level is low the trees will die”. In addition, the area is protected from the sand dune ‘creep’ by the periodic flowing of the river, which scours the river bed and stops the dunes from moving northwards. If the river does not flow, the dunes will begin to encroach on the riverbed vegetation.

The Government reacted fast on the floods providing, for example, toiletries and clothes. However, some of these items never reached the communities that stayed far away from the distribution point because they were lacking transport. Thus, aid was not equally distributed among all of the Topnaar communities.

5.3. Summarizing indigenous perceptions of climate change and impact

Some of the community perceptions of climate change and related impacts are close to scientifically predicted changes, while others differ from these. When attempting to compare scientific and indigenous notions of climate change and related impact, it becomes clear that these are not immediately comparable. In most cases, indigenous peoples’ notions of climate phenomena are shaped and perceived through their cultural experience and interaction with the local environment, and often inseparable from the social impact of these phenomena.

Furthermore, most of these communities have not been informed about the phenomena of global climate change, which are beyond their influence and thus difficult to remedy or cope with culturally and socially. Yet, all of the communities experience the consequences of climate change, most directly the pastoralist communities in Kenya that are severely affected by increasing droughts. That may partly explain why several of the communities express that they have lost hope for the future.

The research shows that it is, to a varying degree, difficult to isolate the impact of climate change from the series of other factors affecting indigenous peoples, in particular environmental changes due to governance factors. Further, there are indications of differentiated impact on men and women, given their traditional roles in, for example, fetching water.

Climate change is perceived and interpreted by indigenous peoples through their cultural world, in which the notion of global climate change in most cases is alien or absent. Thus, it must be understood that there are multiple ways of understanding and interpreting climate change phenomena and related social and cultural impacts. Indigenous peoples’ notions of climate change are not separated from their perceptions of

the operations of social-political and environmental systems, as these are necessarily mediated by the institutions of power and culture in each locality. Where climate scientists will tend to focus on scientific facts about climate change, the communities consider the interactions within the political-social environment as equally importance – and articulate that in their perception and interpretation of climate change impact. Hence, indigenous people contribute with important knowledge about aspects and causal relations of climate change and impact not captured in scientific knowledge.

5.3.1 Indigenous peoples' socio-ecological perceptions of climate change

Predicted 1 st order impacts of climate change; based on literature review	Community perceptions of climate change phenomena and 1 st order impacts	Community perceptions of 2 nd and 3 rd order impacts
Ngonaka: <ul style="list-style-type: none"> Salination of freshwater resources Improved conditions of vectoral transmitters of diseases/malaria due to rising temperatures 	<ul style="list-style-type: none"> Disruption of the seasons; Increased temperature; Less frequent / unpredictable rains; Stronger winds and heavier rains Droughts Drying up of rivers and water pollution 	<ul style="list-style-type: none"> More energy and time is required for hunting and gathering activities for the same return. Decreasing income derived from hunting and gathering Quality of life decreased with disappearance of a certain caterpillar which used to be a major source of protein River-resources such as fish and certain plants growing on the banks of rivers are becoming rarer with the drying up of rivers Deteriorating health: increasing incidents of water-borne diseases such as skin- and digestive diseases Medicinal plants are becoming increasingly rare 'Mbako'-bark used to treat malaria is becoming increasingly rare, wherefore more 'modern medicine' is needed, which again causes debt Risk of conflicts with other local people as access points to water become scarce
Boucy Boucy <ul style="list-style-type: none"> Rainfall instability and temperature rises leading to the deterioration of ecosystem services: Increased rainfall lead to flooding of rivers and changing of river patterns 	<p>Salination was not an issue in Ngonaka, which is quite far from the coast.</p>	
Turkana <ul style="list-style-type: none"> Reduced levels of precipitation 	<ul style="list-style-type: none"> Droughts – virtually permanent Floods – more frequent Drying up of rivers, swamps and wetlands Unpredictable rainfall patterns 	<ul style="list-style-type: none"> Severe loss of livestock due to drought – in some places up to 90 % lost Severe famine and loss of lives Availability and quality of water severely affected by drought Availability and quality of pastures, wild game and fish severely affected by drought Escalation of pests and diseases Escalation of conflicts with neighboring communities due to increased pressure on grazing land Infrastructure destroy in floods – hinders communication and access to markets Floods make riverine agriculture possible Floods improve quality of fish in Lake Turkana
Ogiek <ul style="list-style-type: none"> Reduced levels of precipitation 	<ul style="list-style-type: none"> Drought – more frequent and severe Floods – more frequent Drying up of rivers, swamps and wetlands Unpredictable rainfall patterns Increasing temperatures 	<ul style="list-style-type: none"> Famine Declining water sources The productivity of the land is affected by increasing temperatures and by floods degrading the land Use of fertilizers and hybrid seeds is increasing due to soil degradation, which increase the cost of production Human health is adversely impacted by increasing temperatures
Maasai Reduced levels of precipitation	<ul style="list-style-type: none"> Droughts - more frequent and severe Floods – more frequent Drying up of rivers, swamps and wetlands 	<ul style="list-style-type: none"> Livestock-holdings are decreasing to the extent that many families can no longer sustain themselves on livestock-production Availability and quality of water severely affected by drought

<p>Maasai</p> <p>Reduced levels of precipitation</p>	<ul style="list-style-type: none"> • Droughts - more frequent and severe • Floods – more frequent • Drying up of rivers, swamps and wetlands • Unpredictable rainfall patterns • Increased occurrence of frost 	<ul style="list-style-type: none"> • Livestock-holdings are decreasing to the extent that many families can no longer sustain themselves on livestock-production • Availability and quality of water severely affected by drought • Women spend whole days fetching water during severe droughts, and risk sexual assaults or attacks by wild animals as they are out from before dawn till after dusk • Women get back-pain from carrying water over long distances • Young girls have to leave school to assist in collecting water • Decreasing availability of medicinal plants – have to travel long distances to buy plants that used to be readily available • Difficulties in practicing beekeeping – honey used in social and ritual functions, and as medicine • Grasses and plants are scorched with the frost • Livestock have to be kept at home well into the morning when the sun has warmed up the land. • Frost affects the quality of pastures, the health of vegetation and crops, and reduces soil fertility. • Frost causes an increase in diseases for both humans and livestock • Children are unable to travel to schools in the morning during frosts, which affects their performance. • Traditional knowledge can no longer predict rains and droughts
<p>Hai//OM</p> <p>Increasing drought and precipitation variability;</p> <ul style="list-style-type: none"> • droughts will be more prolonged and intense • abnormally high rainfall events are likely to become more frequent <p>Tsintsabis area:</p> <ul style="list-style-type: none"> • Heat stress and higher rates of evaporation • Lower soil moisture • An overall trend towards declining annual rainfall • Increasing runoff when rains come and lower rates of aquifer recharge (water stress). 	<ul style="list-style-type: none"> • Disruption of seasons • Irregularity of rain • Decreasing rains • Rainy season starting and ending later • Increased floods • Droughts / !Khurub (hunger-drought) • Severe frost (worst ever in 2011) • No frost on the grass at the end of the rainy season anymore – this might be the reason why the rain continues • When the #Naob bird (Hamerkop) goes into the bush and makes a special sound it calls the rain 	<ul style="list-style-type: none"> • Plants produce less food or rot (rains stop later and berries rot) • Increase in water-borne diseases (parasites, worms) • Increase in breeding places for mosquitoes (stagnant water after floods) • Poisonous ‘slangkop’ plants thrive after floods – threaten livestock • Severe frost kills shrubs/trees/other plants, including most of the sweet berries

<p>Topnaar</p> <ul style="list-style-type: none"> • Heat stress and higher rates of evaporation • Probable (but yet non-quantified) changes to the fog-regime Lower rates of aquifer recharge (water stress), lower water tables and a decline in plant cover in the Kuiseb linear oasis • Increased runoff during abnormally high rainfall years inland, with prolonged and intense floods of the Kuiseb river • Sea-level rise implies the possibility of saltwater intrusion into coastal aquifers 	<ul style="list-style-type: none"> • Increasing annual rainfall • Increasing floods • Decreasing winds • Decreasing temperature (predicted for the near future) • Connection between winds and floods: winds increase when floods are less. 	<ul style="list-style-type: none"> • Increase in predator attacks on livestock – when it is driest, or when floods have washed away other food sources • Drowning of livestock during floods • !nara plants washed away by the floods • !nara plants growing on the Southern bank of the river benefit from floods • Increase of food aid during floods • Increased employment opportunities after floods (repairing damages) • Plants and gardens damaged by strong winds • Need to stay indoor due to strong winds (no cooking outside) • More fodder for livestock as strong winds blow down pods from trees • More energy to work as temperature decreases (prediction)
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6. Traditional Knowledge and Adaptation to Climate Change

As can be seen from the previous sections, all of the concerned communities combine traditional and non-traditional livelihood elements, in multi-faceted and flexible strategies, shaped by cultural values and norms. These will be summarized in the following section, along with an analysis of indigenous peoples' adaptive capacity and resilience.

6.1. Indigenous peoples' adaptation strategies

The following table summarises the coping and adaptation strategies followed in **Boucy Boucy**:

Coping and adaptation strategies developed by indigenous community of Boucy Boucy

No.	Environmental / climate change impact observed	Coping / adaptation strategy	Traditional knowledge or new adaptation
1	Deforestation	Gathering wood and leaves at greater distance from village/ camp (e.g. koko leaves could be gathered from 1 minute away and are now a 2 hour walk away)	New
2	Increasing rarity of medicinal plants	Searching for plants at greater distance from village/ camp	New
3		Planting of some medicinal plants around camp	New
4		Resorting to modern medicine unlike grandparents (which leaves them in debt)	New
5	Drying up of rivers	Carry out less fishing activities	New
6		Fishing with net and line (instead of spears/harpoons)	New
7	Water pollution	Digging of water points	Traditional activity practised more frequently
8		Resorting to wells	New
9		Gathering of water from plants/vines in the forest	Traditional activity practised more frequently
10	Impoverished forest	Using far flung hunting grounds	More frequently
11	Increased temperature	Building of shelters made of leaves from the forest (called "essembé")	Traditional adaptation
12		Building of shelters made of cut branches (called "epouta")	Traditional adaptation

As can be seen in the table above, many of the adaptation strategies are based on traditional knowledge. Some adaptations consist in more frequent use of traditional knowledge; others are genuinely "new" adaptations. It should be noted that these adaptations are also influenced by factors other than climate and environmental change such as the availability of new technology or service (for example modern medicine); or the influence of Bantu neighbours and village life. Even when new technology is a factor in provoking a new adaptation – such as hunting by electric torches – this is combined with traditional knowledge of hunting practices and animals of the forest. Likewise, the ability to travel large distances on foot in the forest – and to spend extended periods of time – allows adaptations such as accessing hunting and gathering areas further away from the village. The lack

of prior knowledge of communities about climate change hindered this research as it was not always possible for the community to identify the reason for the new adaptation or strategy.

The research from **Ngonaka** supports these results, as the following adaptations were noted:

- The digging of water points. This practice is recent and seems practical to get water quickly and at reduced cost;
- Changes in agricultural practices such as the use of selected variety of plants has been mentioned by community members as a possible strategy, which is not implemented due to the lack of access to such plants.
- Making use of their knowledge of forest. This adaptation strategy especially consists in going further away into forest areas that they don't usually use.

Further research would be required to access how these strategies complement new scientific information.

In the case of the **Baka and Babongo**, formal institutions play almost no role in the elaboration of their adaptation strategies, especially because they do not participate in formal local decision-making processes. The adaptation strategies mentioned above have been formulated by the communities themselves without external help. Indeed, external institutions have hindered these adaptation strategies, at times, by restricting access to the forest. The only exceptions to this are the availability of water wells in the village and access to modern medicine. In **Boucy Boucy**, the community stated that the access to state service is "poor" and has not improved in the past twenty years.

As regards institutions, traditional decision making processes of the community involve the following elements:

- A decision which can be taken by the community as a whole might not be followed-up by everyone. Every member of the community is free to decide his/her own priority. In that way adaptation strategies can be collective and/or individual;
- Daily decisions are taken according to the needs to be fulfilled (food, water etc.), there is hence a high level a flexibility related to adaptation strategies;
- Decisions are easily implemented within the household and small groups (camp);
- Decisions that concern the community as a whole are made collectively and not unilaterally.

This leads to a high level of autonomy and potential for new adaptive strategies to develop and spread within the community.

The **Topnaar**, in order to cope with situations such as the flood in 2011, inform that they "pray every day and night". Further, being accustomed to small – instead of large - livestock farming and harvesting !nara in the harsh environment of the Namib Desert constitutes a good point of departure or the Topnaar to adapt to future climate change. Additionally, the diversity of livelihood elements (combining livestock, !nara harvest, pension, food aid, employment and piecework) can also be seen as an adaptation strategy in this super-arid environment.

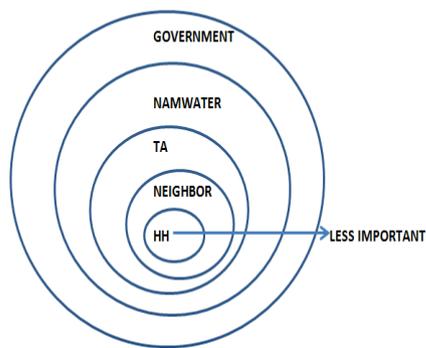
The community could **respond better to floods** if they know when the floods are coming. For example, they could keep their animals in the kraal to stop them from straying away from home. But better communication strategies (i.e. "early flood warning systems") would be needed in order to take preventive measures.

The following table provides an overview of the hazards and potential responses by the community members.

Correlation between hazards and responses: Perception of Topnaar community	
Floods	Responses
Water pumps washed away	<ul style="list-style-type: none"> • Dug water from river bed, use traditional wells • Buy generator to abstract water from the river • Collect water from other communities
Animal diseases	<ul style="list-style-type: none"> • Use natural remedies • Ask advise from Agricultural extension officer
Animals washed away or stuck in mud	<ul style="list-style-type: none"> • Better monitoring of own livestock • Better communication system about floods • Move livestock sheds (“kraals”) towards the gravel plains, away from the river
Fodder (pods) less	<ul style="list-style-type: none"> • Suggestion of cooperative to collect pods before flooding starts
!Nara fields affected	<ul style="list-style-type: none"> • Allowing !Nara fields to recover • Cultivating !nara on small-scale • Stressing the importance of sustainable harvesting methods (to date, without success)
Drop in water level	
Changes in vegetation	<ul style="list-style-type: none"> • No response given
Drought	
Lack of grazing	<ul style="list-style-type: none"> • Focusing on adapted livestock such as goats and donkeys • Go to other grazing areas
Wind	
Solar panels blown away	<ul style="list-style-type: none"> • Wait for Namwater to fix it
Ligthening	
Livestock killed	<ul style="list-style-type: none"> • Getting livestock out of kraal

The Topnaar specified different coping strategies related to diverse well-being categories within the community in regard to frequent floods: the better off households can collect food aid with the car, while the medium and the poor have problems with transport. Furthermore, the better off households can collect the Ana tree pods before the flood starts with their cars. This means that they have fodder reserves when the floods occur, while the medium and the poor do not. In general, it was argued that the better off people can cope better compared to other groups, since they can pay workers and have better connections to the Government (e.g. having family relations with the Traditional Authorities). Thus, the adaptation strategies of the Topnaar community depend on the well-being of people, since households in the wealthier category are more likely to adapt to changes compared to the poorer category.

FIGURE 6: Importance of institutions: Perceptions of the Kuisieb River Topnaar community



Based on the experience during the floods of 2011, a figure was made to find out **which institutions were the most important** (the larger the circle the less important) for the community. As can be seen, the household and neighbors are regarded as most important. Also, the Traditional Authority was still important, despite the community's mistrust in them, since the Government deals with the community via the Traditional Authority. Namibian Water Supply

In general, in order to cope with changes in their environment, the Topnaar suggested that it is important to diversify their livelihoods. In order to change from harvesting !nara plants, there should be more employment opportunities, in the local area as people do not like the life in the towns because they cannot adapt to it, and the cost of living there is high. Another strategy is selling of crafts (jewellery from the !nara and Ana pods) or traditional Nama dresses next to the road, which might be bought by tourists, but apparently the quality of the craft works is not good enough.

The **Hai|om** community wants the Government to buy land and support them to become sustainable farmers. The Hai|om community had difficulties thinking of more adaptation strategies, as they are faced with other constraints, such as the access to land, which has a larger influence on their livelihoods. The community is highly dependent on Government aid, both in terms of pensions and food relief. To adapt to the lack of access to resources, people have tried to diversify their livelihood strategies, for example collecting and selling of firewood. However, commercial farmers in the vicinity usually do not allow them to collect this and some people were beaten up.

When exploring the correlation between hazards and responses among the Hai|om community, they almost uniformly declared that the responses were to:

- 1) Being more dependent on government aid, and;
- 2) Diversifying livelihood strategies by collecting firewood and producing poles.

It can be concluded that many of the adaptive "strategies" of the Hai|om and the Topnaar refer to government aid.

The three **Kenyan** communities indicated a variety of strategies to adapt to climate change hazards, some traditional, others modern.

The Maasai reported four major coping strategies, namely: mobility/migration, feeding livestock with leaves, buying fodder for livestock, and engaging in small businesses. For their part, the Turkana reported six coping strategies, namely: mobility/migration, gathering wild plants and fruits, fishing, charcoal burning, and basket-weaving. The Ogiek, reported a total of 10 coping strategies. Among the strategies they listed which were not articulated by the Maasai and the Turkana are hunting, salaried employment, keeping livestock for milk and meat, trading in livestock, storing of food, raising awareness about hazards to

strengthen resilience, keeping modern bee-hives for gathering honey, diversifying crops and planting trees. Adaptation strategies of the Maasai were largely related to livestock, while the Turkana demonstrated a strong dependence on traditional practices supplemented with income-generating activities that depend on use of natural resources.

As the main climate hazard is drought, many strategies aim at overcoming the impacts of drought, ranging from strategies to improve management of natural resources to those that involve diversifying the modes of production in order to benefit from alternative sources of food and income.

With regards to livestock, pastoralists are adopting new and improved breeds that have a higher survival rate in drought conditions. The Maasai and Turkana are increasingly showing preference for sheep, goats and donkeys which are reported to be more tolerant to droughts as they can survive longer on less vegetation than cows. They also multiply much faster than cattle, a useful trait that facilitates regeneration after bouts of drought. Donkeys have the additional appeal of being useful for women when they travel long distances to fetch water. The Maasai in the case study area are now keeping camels which are also more attuned to drought,

Markets for livestock are found largely in Nairobi and other urban centres, far from the rural areas where pastoralists live. The cost of moving livestock to these markets is so high that pastoralists are forced to sell their livestock through middlemen who undercut their profit margins, thereby acting as a disincentive to sell their livestock. The result is that pastoralists sell their livestock only when they must, and then for very poor returns. Health services on the other hand have deteriorated greatly since government cut back on provision of support to extension. Animal health services have been privatized, but this effectively means that they are not available in rural areas. Instead, pastoralists make do with traditional treatment techniques, which are often overwhelmed especially in moments of crisis as a consequence of major climate related events such as droughts and floods.

While traditionally pastoralists used seasonal mobility as a strategy for coping with climate variability, this is becoming increasingly difficult as a result of population growth, land tenure change and resulting land pressure. Although the Turkana are still able to move their livestock over fairly long distances even going into neighbouring countries of Uganda, South Sudan and Ethiopia, the Maasai are hemmed in by other land uses such as agriculture, national parks and settlement. However, even the Turkana have to contend with increasing challenges associated with conflicts over access to strategic resources. Moreover, with education being compulsory and free, constraints have increased as more and more children and youth go to school. Traditional options for coping with drought are increasingly unavailable to the Maasai who live around Naivasha. In the past, they would move their livestock to the riparian area around Lake Naivasha. However increased settlement and enclosures around the Lake, coupled with the influx of hotels and floriculture and horticulture farms around the lake have rendered the lake inaccessible. New coping strategies adopted by the Maasai in the area include pooling of herds and labour, and keeping livestock in distant camps. This unfortunately, denies households access to milk and other livestock produce with adverse consequences for nutrition and health. Improved management of land and natural resources is another important adaptation strategy. This includes protection of water-catchment and dry season grazing areas through collective agreements, often under the supervision and guidance of elders. The main

The **Ogiek** mention tree planting, individually and collectively, as a general response to the changing landscape and reduced forest cover. Notably, there have emerged a number of initiatives in the form of community associations and self-help groups wherein members pool resources and labor to conserve, plant and trade on herbal plants and trees. Individually, people mentioned

strategy for coping with floods is movement to higher ground, and for this reason, community members are paying more attention to weather reports and making better use of early warning systems operated by government and other development projects. With regards to frost, it was reported that the communities use spraying and mineral salts to protect their crops and livestock.

The digging of shallow wells and water-harvesting is used to improve availability of water resources. Maasai and Ogiek respondents emphasized the use of soil conservation techniques that include planting of trees and special types of grass as well as terracing to minimize soil erosion. All the three communities also indicated that they are paying more attention to the conservation of indigenous trees and forests where these exist, and planting the same in individual homesteads.

The communities are increasingly diversifying their livelihoods and production systems to cope with climate change. The Maasai and Turkana reported taking up bee-keeping and fish farming respectively. Poultry keeping was also reported especially among the women in the three study sites. Fishing has traditionally cushioned the Turkana against severe impacts of droughts. The community reported how people would migrate closer to Lake Turkana during periods of drought in order to catch fish and feed their livestock on the riparian vegetation. However, drought has affected this opportunity as the resources along the lake have dwindled due to the drying up of rivers that feed into it and a retreating shoreline. Even fish catches have significantly reduced and fishermen have to move further into the lake to obtain meaningful catches. This requires the use of expensive powerboats and sophisticated fishing gear that are out of the reach of communities. Fishing is thus increasingly taken over by the rich and powerful from whom ordinary Turkana now have to buy the fish.

In all the three communities, it was reported that farming has become a major production activity. Women in particular are actively engaged in the cultivation of potatoes, maize and beans, which have also become part of their diets. All the three communities reported increased attention to cultivation involving the use of modern farming techniques, paying more attention to preparation and timing of planting to make the best use of the rains. They reported increasing use of improved, certified, fast-maturing and drought-tolerant seeds, organic manure, and for some of the better off, agro-chemicals and fertilizers. In addition, some respondents reported paying more attention to public information about climate change, including relying on advice from the meteorological department about appropriate times for planting crops. These changes in production systems are also reflected in changing eating habits, with the communities using more grains in their diet; changes in land tenure with increased individualization, and the adoption of food storage technologies, storing grains to guard against the possibility of bad harvests in the future.

Income-generating activities such as making and selling of beads and bracelets, weaving of baskets, charcoal burning, and petty trade are some of the alternative modes of earning livelihoods being adopted by indigenous peoples in the study areas. Women in particular are involved in petty trade, selling traditional artifacts and household items such as cooking fat, sugar, paraffin, and salt. Others have developed into serious business owning shops and posho mills for grinding maize. Other adaptation strategies against climate change include settling near urban areas in order to have easy access to social services such education and health; women creating mutual support groups popularly known as 'merry-go-round' through which they pool funds to support the purchases of key household items and even investments; pooling of resources and labour for cultivation; accessing relief food and other humanitarian aid and emergency assistance as well as government remittances.

The main cause of migration was indicated as drought as people search employment and alternative means of livelihoods in the towns after they or their families lost all their livestock as a result of drought. Young people who are no longer able to support their livelihoods through traditional modes of production take up employment mainly as casual labour in neighbouring farms or in urban centres. Some respondents reported migrating as agricultural land uses increased in their areas, restricting access to land for grazing. Yet others, especially the youth migrate to go to school.

Asked whether the communities participated in district level decision making, 61% of Turkana respondents confirmed that the community participated in district level decision making against 22% of the Maasai and 50% of the Ogiek respondents. The proportion of women in this category was much less than the men across the three communities, although the percentage in Turkana was relatively high at 45%. The same picture applies with regards to decision making at the district level regarding climate hazards, with an average of 54% felt that their communities were consulted in district level decision making about climate change hazards. Here too, there were more Turkana respondents who agreed that the community was consulted. That more respondents in Turkana should be able to participate in decision making may have a lot to do with the active involvement of NGOs in the county, many of which have programmes that seek to promote public participation in policy discussions and processes. The area has also benefited from interventions by the Arid Lands Resource Management Project (ALRMP), which for over a decade has supported community empowerment in Turkana and other ASAL districts of Kenya.

The data indicates that the roles and importance of traditional institutions are gradually diminishing. This can be attributed to the increasing relevance and power of new formal organizations such as NGOs and churches, but also because of lifestyle and resource governance changes brought about by formal education and land laws that encourage land individuation. This said, various elements of traditional institutions are still very much relied upon by the communities to cope with livelihood challenges brought about by climate change. Elders are still crucial for decision-making in all the communities and play a big role in enforcing resource-related rules and do not shy away from using traditional curses and spells to intimidate and punish offenders. Age sets, medicine experts, and prophets also still play significant roles in Maasai and Turkana communities, especially as it regards to division of labour, managing health problems, and providing information to predict and cope with natural phenomena. During discussions, traditional institutions appeared to be under stress, largely for lack of formal recognition and support, but people still relied on them since they are accessible, rooted in peoples' cultures and norms, and are understood by all. The graphs below, show the variety of institutions that the communities turn for advice and have received support from in the past:

Fig- 44: Who do you turn to for advice on climate change-related hazards

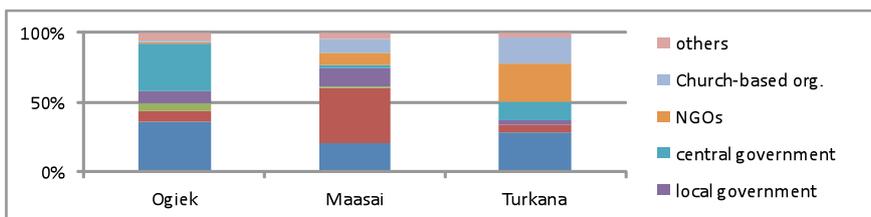
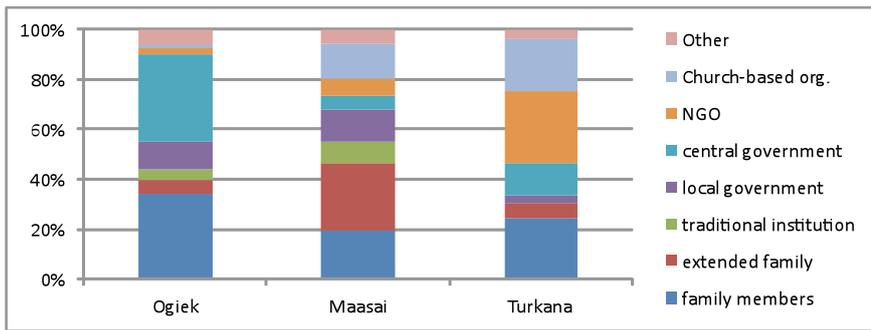


Fig. 45: Who have you received assistance from on climate change-related hazards?



6.2. Indigenous peoples' adaptive capacity and resilience

Analysis of the results of the field work among the **Baka and Babongo** point to five broad factors that reduce indigenous peoples ability to minimize the impacts of and adapt to climate change:

- High dependency of community on natural resources for sustenance and livelihoods – therefore if these are threatened the consequences are direct and severe;
- Discrimination of indigenous peoples vis-à-vis Bantus – therefore weaker economic situation and access to information and state services or adaptation projects were they to reach the village;
- Lack of understanding or respect of way of life by external actors and indigenous peoples specific rights under the national legislation – therefore denigrating traditional cultural values and knowledge of indigenous peoples and pushing them into new livelihoods which may not be suitable;
- New pressures on forest resources (from logging and mining activities) – leading to loss of important tree species and increased competition for, and reduced access to, forest resources (although providing a little formal employment);
- Low level of literacy and access to information – therefore posing a challenge to awareness-raising - – and limited capacities of indigenous organisations.

And two factors that support IPs ability to respond to climate change:

- In-depth knowledge of the forest and its resources – the traditional knowledge of IPs about forest resources;
- Traditional adaptation strategies such as mobility – allowing them to move easily between resources depending on their availability.

Among the **Hai|om**, the results of the field work points to several factors that reduces indigenous peoples ability to minimize the impact of, and adapt to, the impacts of climate change:

- Access to land
- Outsiders
- Lack of political representation

The current adaptive capacity of the community is very limited. Whereas their traditional strategies (e.g. high mobility, self-reliance, sharing) were without doubt related to climatic conditions, most of their current adaptation strategies are not directly related to climate change, but more to the broader situation in which the Hai||om communities are living. Decreasing access to land, and policy restrictions on hunting has severely limited their possibilities for applying their traditional livelihood strategies of hunting and gathering. The Hai||om community at Tsintsabis is highly dependent on Government aid: the most important livelihood strategy is pension. This money is mostly used to pay for school fees and food. Food aid was also an important livelihood strategy. However, field data show, that knowledge on the traditional strategies is maintained within the communities.

The Hai||om community in Tsintsabis and Farm Six gave a list of bush food that in the past would make a central part of their diet. They would tell the names of the different foods, when they would be harvested in terms of seasons and sometimes how to preserve some foods. However, because the Hai||om do not have land of their own, they do not see it necessary and relevant to pass the knowledge regarding bush food to their children. The lifestyle of the Hai||om has significantly changed primarily as a result of dispossession and consequent government and non-governmental interventions. Bush food gathering has been replaced with food aid, pension and piecework. Criminalisation of hunting has also limited the flow of hunting knowledge and skills to the children and youth. By and large, the vast indigenous knowledge, especially of hunting and gathering, amongst the Hai||om community seems to be getting less important to them or rather is in danger to get lost. Consequently, such knowledge whose development depends on the attachment of the Hai||om to land does not significantly help the Hai||om to adapt to climatic changes.

The research focused on the adaptability of the Hai||om and the Topnaar communities to climate change. After collecting data some differences were found between the respective communities. The Topnaar community are less poor than the Hai||om and have more assets in terms of livestock and equipment (e.g. donkey carts). They are mainly relying on two resources for their livelihoods, namely Inara plants and livestock, which are subject to climate change. Other livelihood strategies (e.g. pensions, food aid, employment, piece work) supplements livestock farming and Inara harvesting. Thus, although less vulnerable in the overall picture (more assets and a lower poverty level), the Topnaar community might be more vulnerable to the impacts of climate change compared to the Hai||om. The Hai||om are highly dependent on government aid and less dependent on different natural resources due to their lack of access to land. This was confirmed by assessing the local perceptions of climate change. Even though there are several predictions and current impacts of climate change affecting the Hai||om community, these are not yet felt, since the lack of access to land is the issue which makes them most vulnerable.

In **Kenya**, the Ogiek reported more coping strategies than the Maasai and the Turkana. The difference may well be a function of the higher levels of education within the Ogiek community and the active involvement of NGOs in the area. The keen interest in the Mau Forest Complex among environmentalists in Kenya and the rest of the East African region led to the establishment of a Government Task Force by the Prime Minister and the creation of an Interim Coordinating Secretariat for the conservation of the forest. Government efforts were lauded as playing important roles to restoring the depleted forests, such as the current Mau Forest Reforestation Program through Kazi Kwa Vijana structures. The Kenya Forestry Department and the Kenya Wildlife Service were also mentioned as playing important roles in the process. The Ogiek have been actively involved in these activities through the Ogiek Welfare Council (OWC) and the

Ogiek Peoples Development Programme (OPDP). Moreover, the site of the Ogiek case study area is quite close to the bigger town of Nakuru and therefore the level of awareness among the community about issues of development and climate change are relatively higher than in the sites of Maasai and Turkana case studies.

Indigenous communities decry the lack of consultation and effective participation for them in the design of strategies and interventions to address the challenges of climate change, as well as inadequate provisions for the application of their indigenous knowledge, systems and institutions even where these exist.

The formal governance institutions constitute important foundations that determine indigenous peoples' adaptive capacities. Traditionally, policies of government in Kenya have been generated in a top-down fashion on the basis of imperatives from the centre in Nairobi and other urban centres and with limited or no participation by local communities. Those policies and the institutions and infrastructure they put in place have thus not been appropriate for facilitation of community action in adapting to climate change, largely because they tended to ignore community knowledge systems and structures of decision making. However, institutional capacity and community organization is not only a problem because of the erosion of traditional systems and institutions. It is also a problem because institutional arrangements introduced by the State, which have undermined the traditional ones, are not effective in themselves. They have inadequate reach within the communities, as they are mainly based in urban centres away from the rural areas where the bulk of the communities live and do their production activities. They have limited legitimacy with the communities as they are not based on knowledge systems and imperatives that the communities readily identify with. The end result is an institutional gap that largely undermines the capacity of communities to organize and respond to challenges, including those associated with climate change.

For pastoral communities such as the Maasai and the Turkana, access to markets, animal health services and appropriate livestock breeds are critical for improved adaptation to the impacts of climate change.

In all the three communities, it was noted that IPs are engaged in farming by way of adaptation to climate change. However, for them to succeed in this regard, they need access to appropriate technologies of production as well as drought resistant and fast-maturing seeds and other farming inputs such as fertilizers. They also need access to markets to sell their produce. For the Ogiek this includes support to bee-keeping, building on their traditional knowledge and practices. Appropriateness of technologies of production is a big issue of the Ogiek who complain about the introduction of power saw in the Mau, which has resulted in reckless and indiscriminate logging of trees leading to deforestation that has further undermined integrity of their habitat and therefore their livelihoods.

Changing land use patterns affect the adaptive capacity of all the three communities. Among the Ogiek, changing land uses and land use patterns are blamed largely on migration of other communities into the Mau Forest Complex. These communities have through settlement and farming practices changed the use of land in the area leading to loss of biodiversity that previously supported bee-keeping and hunting by the Ogiek. Among the Maasai, land use changes along the shores of Lake Naivasha as a result of the introduction of horticulture and floriculture as well as settlements have blocked the pastoralists' access to the dry season grazing areas along the lake and to the waters as well. The introduction of geothermal energy production in the area has also restricted access to strategic grazing resources as has the establishment of a national park. Within the communities themselves, demographic changes are impacting on land use. Education and modernization are also critical factors determining adaptive capacity of the communities to climate change. Education opens up new opportunities to engage in other livelihood pursuits both within their areas and further afield. Educated sons and daughters take up employment in the towns and provide an additional coping mechanism as their remittances help families in times of climate related crises. Moreover, education is important for facilitating community organization and adoption of modern technologies of production so as to cope with the impacts of climate change.

Across the **Maasai, Ogiek and Turkana communities in Kenya**, respondents identified a number of factors that undermine their capacity to cope with impacts of climate change:

- Poor physical and social infrastructure
- Inadequate early warning, disaster risk preparedness and response systems and institutions
- Gaps in natural resource management policy and/or enforcement
- Inappropriate land tenure changes
- Inappropriate natural resource extraction technologies
- Social changes as a result of migration
- Collapse of traditional systems and institutions
- Inadequate capacity of formal natural resource management institutions
- Poor community organization
- Upstream activities, e.g. power generation – Lake Gibe

Many of these factors are outside the control of indigenous communities and require the intervention of government. Unfortunately, government has historically shown little or no interest in addressing these challenges and government interventions have rather tended to further undermine indigenous peoples' systems and institutions. Moreover, the modern systems and institutions introduced by governments are often alien, under-resourced and ineffective. The net result is that traditional systems and institutions which have historically served these communities effectively are rendered inoperative, while the new institutions introduced in their place are incapable of delivering. This translates into institutional gaps that further weaken communities' coping mechanisms. Other factors are a function of the interaction between changes taking place in the wider society and within the communities. These include inappropriate land tenure changes; inappropriate natural resource extraction technologies; social changes arising from migration; collapse of traditional systems and institutions; and poor community organization. Yet other factors have to do with cross-border interactions of the environment and natural resources. In Turkana, the upstream power generation by the Ethiopian government in Lake Gibe is threatening the integrity of Lake Turkana and its ecosystem.

6.3. Summarizing indigenous peoples' adaptive capacity

All communities included in this study share a situation of marginalization with regards to participation in decision-making. This reflects the general situation in the African region, where there is weak but growing constitutional and legal recognition of indigenous peoples and their rights, including to participation in decision-making. The recent constitutional and legislative developments in Congo and Kenya open up new opportunities for indigenous peoples and constitute examples of good practice that may inspire other African governments to address the situation of indigenous communities as an urgent matter of non-discrimination and equality. However, the concerned communities are still to see the effect of these developments on the ground. Also provisions targeting vulnerable and marginalized groups and targeted programs such as the San Development Division, provide openings that could eventually address the discrimination and marginalization of indigenous communities, particularly if such programs would adopt a more rights-based approach.

Customary law and customary law and traditional governance institutions still play an important role for indigenous communities. However there are only few examples of official recognition of these institutions within the formal governance structures. And where these are recognized but individualized and not receiving support for their proper functioning, they may be prone to abuse by the powerful and influential sectors of society.

The table below provides an overview of the communities' reliance on traditional and community institutions and on government institutions. It can be concluded that traditional institutions, households, extended families, clans and communities are still the most reliable institutions that people can turn to. Where indigenous representatives have been recognized by government, these have also to some extent been coopted and are perceived as part of the government set-up rather than genuine community representatives. Overall, most government policies regarding access to land and resources are limiting the communities' capacity to adapt. Within this context, much government support is provided as non-sustainable cash transfers or external technical assistance, which creates dependency rather than supporting long-term sustainable adaptation and does not contribute to strengthening their social, political and cultural institutions.

Communit	Reliance on traditional institutions	Reliance/support from government institutions
Baka and Babongo	Clan-related settlements known as camps are units of production and of dissemination of products collected in the forest. Moreover, they are egalitarian political units, where decisions concerning the whole community are made, usual after thorough discussions have led to a consensus. The members of a clan are linked by a strong solidarity based on common ancestor, Traditional decision-making involves collective and/or individual strategies, daily decisions according to needs, implementation of decisions by household and camp and, collective decisions for entire community. Adaptation strategies have been formulated by the communities themselves without external help	External institutions have hindered these adaptation strategies, by restricting access to the forest availability of water wells in the village and access to modern medicine Access to state service is "poor" and has not improved in the past twenty years
Topnaar	Household and neighbours are regarded as most important	Waiting for Namwater to fix solar panels

	<p>coping with climate-related hazards.</p> <p>Traditional Authority recognised by government but not representative; better off people can cope better as they have better connections to the Government (e.g. having family relations with the Traditional Authorities)</p>	<p>Asking advice from Agricultural extension officer on animal diseases</p> <p>The community is highly dependent on Government aid, both in terms of pensions and food relief</p>
Hai Jom.	<p>Traditional Authority recognised by government but not representative. Headman allegedly involved in land transactions;</p> <p>Dependency on extended family for sharing</p>	<p>Community wants the Government to buy land and support them to become sustainable farmers but it has not happened.</p> <p>Ministry of Land and Resettlement (MLR) does not want to offer assistance to the communities; when community takes complaints to the regional councillor they are referred back to the MLR office</p> <p>The community is highly dependent on Government aid, both in terms of pensions and food relief.</p>
Ogiek	<p>The family and – to a lesser degree – the extended family are key for advice and support in the face of climate change hazards</p> <p>Community associations and self-help groups where members pool resources and labor to conserve, plant and trade herbs, plants and trees.</p> <p>Individually, people make efforts to plant trees within their farms, but also along riverbanks</p> <p>Involvement of the Ogiek Welfare Council (OWC) and OPDP in forest conservation efforts.</p>	<p>Government efforts, such as establishment of a Government Task Force by the Prime Minister and the Mau Forest Reforestation Program, were lauded as important for restoring depleted forests. The Kenya Forestry Department and the Kenya Wildlife Service were also mentioned as playing important roles in the process</p> <p>NGOs active in the area.</p> <p>The Ogiek explicitly asked for more support to local, government and other initiatives involved in restoring the Mau Forest Ecosystem.</p> <p>The current school learning programs had no space for the inculcation of important cultural practices and ethnic languages. There is a need for the Ogiek to introduce complementary learning structures where children can learn their culture and languages.</p>
Maasai	<p>Family members (elders) and, in particular, the extended family are key for advice and support in the face of climate change hazards.</p> <p>Age sets, medicine experts, and prophets play significant roles</p> <p>Women create mutual support groups popularly known as 'merry-go-round'</p> <p>Water-catchment and dry season grazing areas are protected through collective agreements, often under the supervision and guidance of elders</p>	<p>NGOs and churches become important because of changes in lifestyle and resource governance brought about by formal education and land laws that encourage land individuation.</p>
Turkana	<p>The family (elders) and – to a lesser degree – the extended family are key for advice and support in the face of climate change hazards.</p> <p>Age sets, medicine experts, and prophets play significant roles</p>	<p>NGOs and churches become important because of changes in lifestyle and resource governance brought about by formal education. Arid Lands Resource Management Project (ALRMP) which for over a decade has supported community empowerment in Turkana and other ASAL districts of Kenya.</p>

In all the cases, indigenous peoples have lost land from colonial times, and this trend continues to this day. The fundamental problem is that statutory law is incompatible with indigenous peoples' customary law regarding access to land and resources and, furthermore, is not in line with international law, enshrined in the UN Declaration on the Rights of Indigenous Peoples and other human rights instruments, which

stipulates recognition of indigenous peoples' rights to land and resources based on traditional occupation. This fundamental non-recognition has severe repercussions in a series of aspects, including land grabbing, land enclosure, influx of settlers, land disputes and conflicts, conflicting land and resource rights within conservancies and protected areas, limited access to credit, etc.

The marginalized position of indigenous peoples is replicated in the context of climate-related strategies, policies and interventions, where there are only few examples of a specific focus on the situation of indigenous peoples. And, where consultations have taken place, these are often undertaken in an inappropriate way, considering indigenous peoples' weak institutional capacity to cope with lengthy technical reports and program documents. A positive example is Kenya, where the relative strength of indigenous organizations has led to the formation of a National Indigenous Peoples Steering Committee.

The current climate changes in Africa are caused by factors outside of the culturally constituted world of the indigenous communities that participated in this study. The decreasing predictability of weather conditions is thereby undermining traditional knowledge and cultural notions of causal relationships. Consequently, from the local perspective, these changes are difficult to conceive, understand or respond to, and some communities recur to "praying day and night" to prevent the hazards to affect them.

In order to enhance their adaptive capacity and reduce their dependency on access to natural resources, all of the concerned communities are diversifying their coping and livelihood strategies, although to very varying degrees. In the most extreme cases, the traditional economy has been almost completely abandoned or is a fallback coping strategy, while the communities are dependent upon cash transfers from governments. The research also found that there are diverse strategies within the communities, with those having better access to education, material assets and political influence being better equipped and therefore having more options for adaptation

In general, many of these new livelihood and coping elements, e.g. engaging in sedentarized agriculture or making use of modern medicines, are linked to the market economy, thus increasing the communities' dependency upon cash income. In diversifying their strategies, the communities combine traditional knowledge and practices with modern practices and tools. Thereby, they demonstrate a flexibility, which also characterizes traditional knowledge, which is "living" knowledge, produced and reproduced – and thus very dependent upon – social relations and the changing environment.

While this flexibility is a strength - and evidently necessary - for maintaining the communities' resilience and capacity to adapt, it may also carry a longer-term risk of undermining indigenous communities' self-reliance and identity. As community members have only limited access to education and training, they often do not master the knowledge that underpins the use, elaboration and maintenance of non-traditional practices, tools and implements. Therefore, they are becoming increasingly dependent upon external assistance. While that is a basic condition for most human beings, it may pose a particular risk to these communities given their marginalized position within the dominant society and limited access to support from government institutions. Some of the communities have received some support or social benefits from government institutions while in other communities, the State seems largely absent. On the contrary,

it appears that most government policies, e.g. regarding land and resources, are actually undermining indigenous peoples' long-term adaptive capacity. In any case, none of the communities included in the study have benefitted from adaptation programs from government or other institutions.

All the case studies confirm that indigenous peoples still possess traditional knowledge that is a major asset in their adaptation to climate change. The case studies did also not suggest that indigenous peoples' traditional livelihood strategies as such have become obsolete or collapsed in the face of climate change. Rather, it seems that the major limiting factors are related to governance and to non-recognition of indigenous peoples' rights, particularly to land and natural resources. It is in this governance-shaped context that that traditional knowledge may become irrelevant and may not be passed on to younger generations. The table below summarized the enabling and limiting factors for indigenous peoples' adaptive capacity, as encountered in the cases examined:

6.3.1. Summarizing factors that enhance or limit indigenous peoples' adaptive capacity

Enabling factors	Limiting factors
Governance issues	
Increasing recognition of indigenous peoples' rights (Congo law, Kenyan constitution)	Non-implementation of constitutional and legislative provisions to protect indigenous peoples' rights (Congo, Kenya)
	Discrimination and marginalization of indigenous communities and, in particular, indigenous women e.g. in terms of access to social services, recognition as citizens, access to basic physical and social infrastructure.
	Lack of data on indigenous peoples in Africa, leading to invisibility, failure to recognize their particular vulnerability and address their particular situation
Recognition of Traditional Authorities in formal governance structures (Namibia)	Government designation and control of Traditional Authorities; no training, capacity-building or resources provided; Traditional Authority institution prone to abuse (Namibia)
	Non-recognition of traditional institutions (Congo, Kenya)
Participatory governance structures (Mau)	Non or low participation in decision-making and governance institutions at central and local levels (Namibia, Congo, Kenya)
Support from NGOs and environmentalists (Mau, Turkana)	Non or weak institutional capacity of indigenous communities (Congo, Namibia)
Targeted programs to reduce vulnerable indigenous peoples (Namibia, Kenya)	Top-down approach of government programs (Namibia)
	Absence of governmental assistance and attention (Congo)
Government subsidies (pensions, food relief etc.) reduce dependency on scarce natural resources and is robust in the context of climate change (Kenya, Namibia)	Inadequacy of government supplies, e.g. only given as short-term relief and not taking into account traditional institutions and structures, livelihood strategies etc. (Kenya, Namibia)
	No access to justice, e.g. in the face of land grabbing and forced labour conditions (Namibia, Congo, Kenya)
	Remoteness from centers of information, education and governance
	Displacement and influx of displaced people due to conflicts (Kenya, Congo)
Establishment of national network of indigenous peoples to address climate-related issues and challenges (Kenya IPNSCCC)	Non- or inadequate consultations on climate change adaptation strategies, policies and programs (Namibia, Congo)
Land and resources	
Provisions for communal land tenure within existing legislation (Namibia, Kenya)	Non-recognition of land and resource rights; non-implementation of existing provisions for communal land tenure; discrimination against traditional land-use and livelihood strategies; undermining of traditional land and resource tenure systems; logging concessions, commercial farms, large-scale development projects (dams, oil exploitation, floriculture) - limiting access to forest resources, bush food, grazing, water; leading to

	landlessness; irrelevance and disruption of traditional knowledge; conflict as natural resources become “open access”. (Kenya, Namibia, Congo)
Government efforts to conserve environment (forest) with participation of indigenous peoples’ organizations	Conservation policies that violate indigenous peoples’ rights and access to land and natural resources and criminalizes their traditional livelihoods (Congo, Kenya, Namibia)
Intact primary forest, provides for food security, continuity of traditional livelihood practices: construction materials, foods, energy, medicines, catchment protection, soil protection, shade, habitat for wildlife and bees, and grazing (Congo)	Influx of non-indigenous settlers. Leading to impoverishment, depletion of resources, increased competition for scarce resource, assimilation by more populous and dominant migrating communities, loss of language and traditional lifestyles (Kenya, Namibia, Congo)
Traditional knowledge, practices and technology	
Culturally-specific concepts and terms for climate phenomena and impact, often integrating climate phenomenon and social consequences in term Relational interpretation of climate, environmental and social phenomenon that science do not necessarily realize. Opportunity for climate change scientists and others to learn from indigenous knowledge and experience. (Kenya, Namibia, Congo)	No information or concept of global climate change, implying that communities are not able to identify climate change impacts; are not able to design long-term adaptation strategies; undermine the authority of traditional institutions as these are not able to provide reliable advice; internalize the responsibility for climate change hazards; feel powerless and appeal to divine forces; are not involved in discussions and decision-making; do not prioritize attention to climate-related processes (Namibia, Congo).
Unsurpassed knowledge of the environment and specialized resources management practices and techniques (Kenya, Congo, Namibia)	Limited access to land and natural resources, increasing rarity of medicinal plants lead to irrelevance and disruption of traditional knowledge (Namibia, Kenya).
Livelihood strategies based on mobility and flexibility (Kenya, Congo, Namibia)	Assimilation/push towards sedentary agriculture; dominant population groups do not learn from indigenous knowledge, regarding the use of wildlife, plants and other natural resources and harvest in an unsustainable way (Namibia, Congo, Kenya) .
Traditional cultural values regarding sharing of scarce resources, serving as mechanism for food security, social safety net, redistribution of resources, community cohesion, solidarity, facilitating access to social services (education) (Kenya, Congo, Namibia)	Impossibility of investments and profit-making in accordance with capitalist/markets mechanisms (Congo, Namibia)
New knowledge, practices and technology	
New practices and technology that enlarges the options, flexibility and mobility of communities, and contributes to the resilience of traditional livelihood practices (e.g. trucks	Technology used to destroy natural resources (Kenya, Congo)
	Increased dependency, increased costs, inaccessibility of new knowledge, practices and technology for poorer

to move livestock, boreholes and water pumps, irrigated agriculture, veterinary services, access to modern fishing equipment, merry-go-round) (Congo, Kenya, Namibia)	community members (Kenya, Namibia)
	Low level of knowledge and skills necessary to make positive use of emerging non-traditional opportunities and livelihood elements (Congo, Namibia, Kenya)
Government or foreign sponsored development projects , e.g. water holes and solar pumps (Kenya, Namibia)	
Migration as a source of income and coping strategy, building on cultural values of mobility and sharing, enlarging options and maintaining community and family relations (Kenya, Namibia)	Cultural values not adapted to life in urban areas; migration, leading to disruption of traditional knowledge, cultural values and community cohesion (Kenya)
Access to weather forecast and information about climate change (Kenya)	Lack of information and warning systems (Namibia, Congo)
Higher level of formal education enlarging the options of individuals (Kenya)	Low level of formal education; marginalization and discrimination with regards to access to education, inadequate education curricula, employment, Education limiting mobility (Congo, Kenya, Namibia)
Diversification, income-generating activities	Lack of skills to compete for employment; employment and economic opportunities in local areas (Kenya, Namibia, Congo)
	No access to credit (Namibia, Congo)
	Limited access to markets, dependency on middlemen (Namibia, Congo, Kenya)

7. Lessons learned and recommendations

7.1. Lessons learned on local knowledge and adaptation strategies

The concept of global climate change – and its potential effects on the climatic and environmental conditions in the various ecological sub-regions in Africa – is largely unknown to Africa's indigenous peoples. Therefore, the increasing unpredictability and effect of climate-related hazards are adding to the political, cultural and social pressures on these communities and may in some cases contribute to the total disruption of traditional practices.

African indigenous peoples still possess a vast traditional knowledge on natural resources and their management in their respective areas. However, under the current socio-political circumstances, particularly the increasing limitations on access to traditional lands and natural resources, the physical, cultural and social space for applying, renewing and further developing this knowledge is reducing, carrying a risk that important elements of knowledge may be lost in the near future or, in the worst cases, that there will be a total disruption of traditional knowledge that may not be passed on to future generations.

African indigenous peoples are affected by climate change, along with many other socio-political factors, which increase their vulnerability. In order to adapt and cope, these peoples are relying on essential elements of traditional knowledge, social structures and cultural values, but also incorporating new elements, values, technologies and knowledge, to the extent that such opportunities are available. Thereby, communities are drawing on the flexibility, solidarity and mobility that characterize their traditional knowledge, practices and values, but also risk increasing their dependency upon knowledge, institutions and services that are beyond their control and profoundly discriminatory in the neglect of the desperate situation of these communities.

Thus, the studies revealed a mixed picture of strong adaptive capacity along with extreme vulnerability and marginalization of indigenous communities. Further, the research did not reveal any concrete evidence of government support to strengthen these communities' long-term strategies for sustainable adaptation. In all cases, the precondition for this would be to seriously address the issue of communities' access to land and natural resources, to ensure the physical space where adaptation could unfold.

In general, the research confirmed the legal and policy-wise discrimination against African indigenous peoples' traditional lifestyles and livelihoods, the replication of discriminatory attitudes at the local levels and the invisibility or disregard of the situation of these peoples for decision-makers. In parallel, indigenous peoples' own representative institutions are being undermined and have only weak institutional capacity to assert their rights, including to basic participation in decision-making that directly affect their lives. In most cases, this marginalization in terms of participation is replicated in the context of climate-related adaptation strategies. Thus, the research confirms the importance of democratization and good governance as a key factor for mitigating the negative effects of climate change for African indigenous peoples and as a means to overcome discrimination. Basically, this requires African governments to address the situation of these peoples in a more coherent and holistic way, acknowledging their fundamental human rights.

7.2. Recommendations: adaptation, mitigation and capacity-building

Drawing on the findings of the case studies, and with due consideration to the severe situations of vulnerability and human rights violations encountered, it is urgent to consider the following recommendations:

- Recognize that indigenous peoples are highly vulnerable to climate change impacts, given their high dependency on natural resources for their livelihoods and their generally marginalized position within national societies.
- Recognize and respect indigenous peoples' traditional knowledge and its relevance for sustainable development and climate change adaptation.
- Adopt a human rights-based approach to climate change adaptation, in line with international and regional human rights instruments and ensuring implementation of emerging national provisions for protection of indigenous peoples' rights.
- Recognize and respect indigenous peoples' right to land, territories and natural resources as an indispensable element of strengthening their long-term resilience towards climate-induced stresses.
- Promote ecosystem-based approaches to climate change adaptation, which would put a higher importance on indigenous peoples' rights, traditional knowledge and sustainable resource management and use practices.
- Recognize and respect indigenous peoples' right to decide their own adaptation priorities, and participate in all decision-making that affects them – locally, nationally and internationally.
- Provide adequate financial and technical support to indigenous peoples' own priorities and initiatives to adapt to climate change, including by ensuring direct access to adaptation funds at all levels.
- Devise targeted programs for particularly vulnerable indigenous peoples, adopting a human rights-based and holistic approach to strengthening their adaptive capacity, including by addressing fundamental discrimination in terms of citizenship rights, access to education and health, etc.
- Provide sustained institutional and capacity-building support to indigenous peoples' institutions to access information, be consulted and participate in decision-making, to respond to climate change hazards and to devise long-term strategies for sustainable community development.

Key instruments for a human rights-based approach to climate change adaptation are the UN Declaration on the Rights of Indigenous Peoples; the African Charter on Human and Peoples' Rights; International Convention on the Elimination of All Forms of Racial Discrimination; ILO Convention No. 169 on the Rights of Indigenous Peoples; ILO Convention No. 111 to eliminate discrimination in employment and occupations.

- Initiate training, awareness-raising, capacity-building and sensitization initiatives at local and national levels, to overcome discriminatory attitudes against indigenous peoples and their traditional livelihood practices.
- Share relevant information on predicted climate change impacts, policies, strategies and programs in appropriate and efficient ways with indigenous communities

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