Participatory Adaptation Handbook

A practitioner's guide for facilitating people centred adaptation to climate change

Noel Oettle, Bettina Koelle, Stephen Law, Shannon Parring, Ute Schmiedel, Emma Archer van Garderen, Tsegaye Bekele

Mechal

VolkswagenStiftung

“You do not need to tell a man who is cold to sit next to the fire.”

(Zambian proverb)

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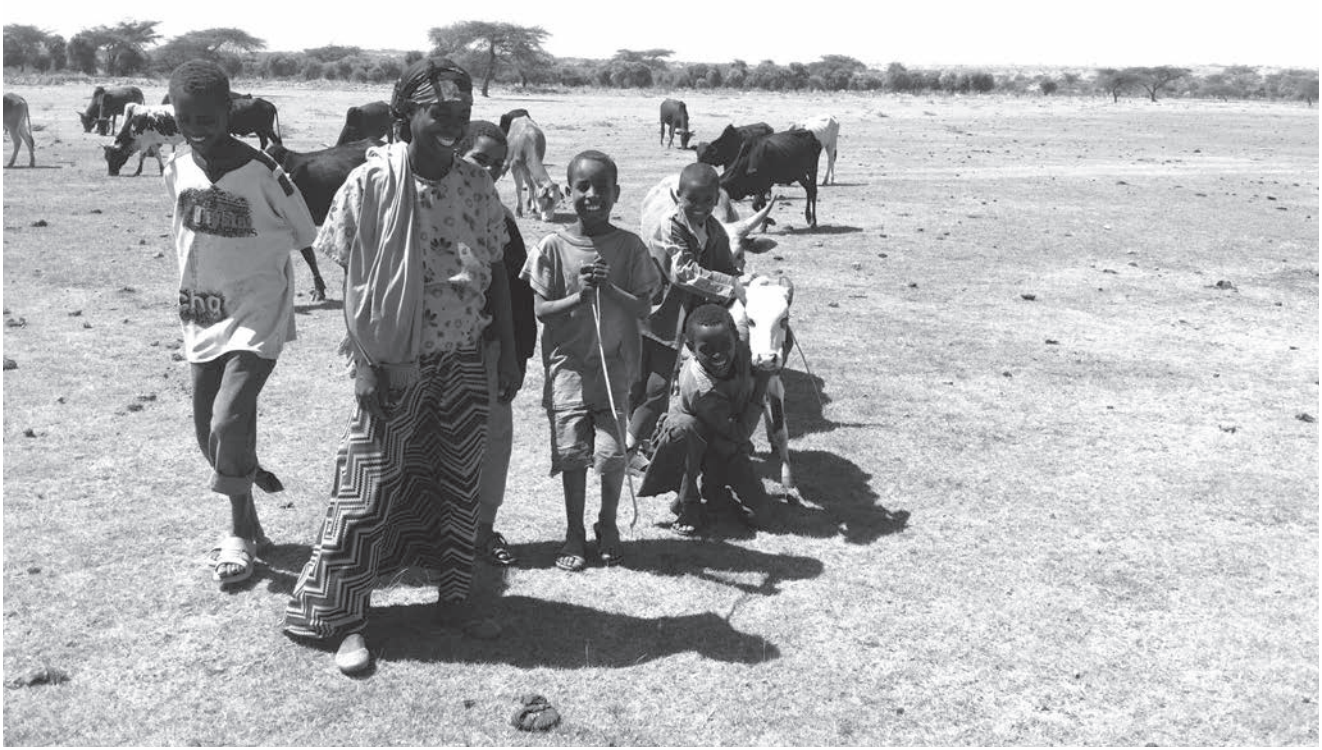

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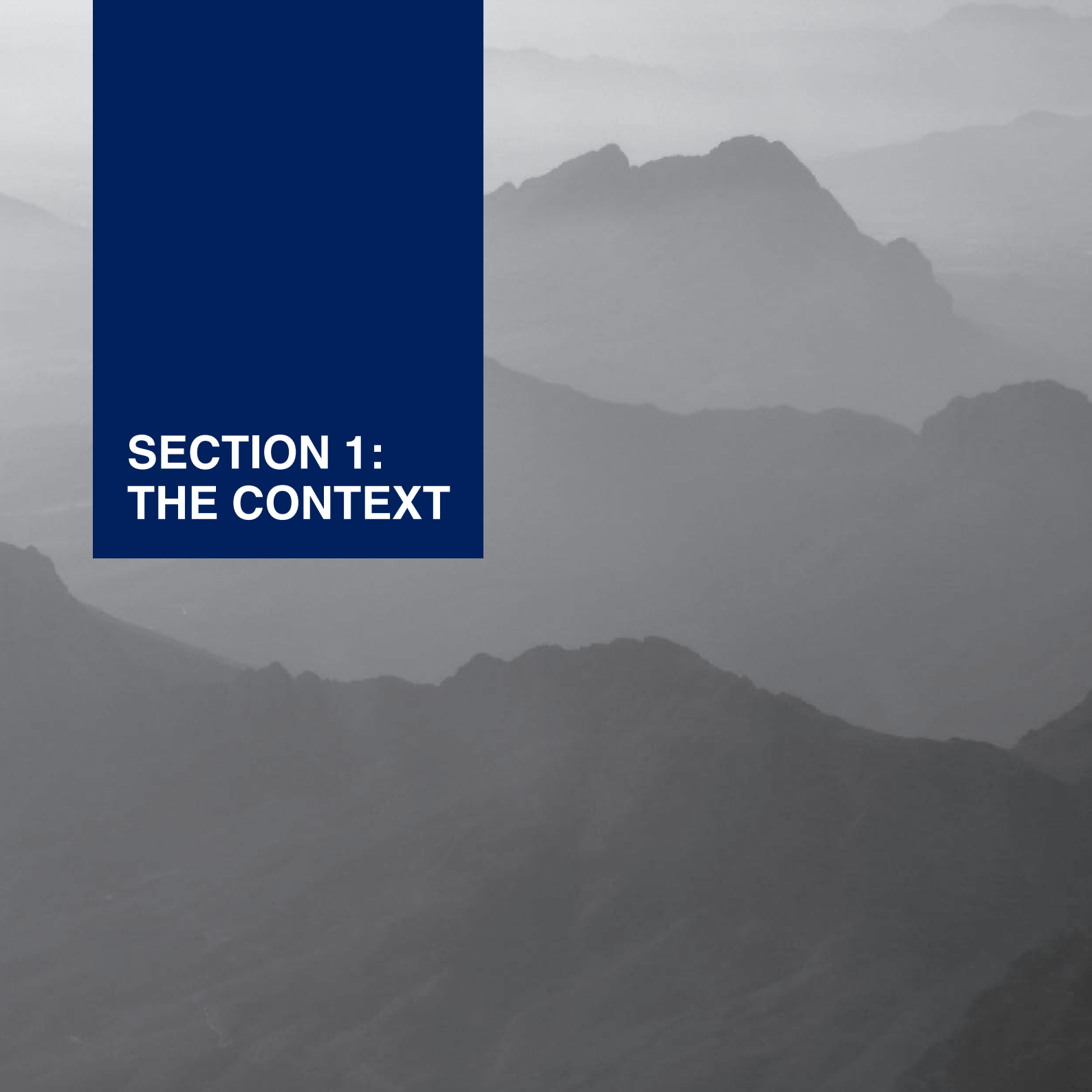


SECTION 1: THE CONTEXT

1.1 INTRODUCTION

This book has been compiled by a group of practitioners from South Africa, Ethiopia and Germany, and draws on our collective experiences in supporting local communities in adapting to increasing climatic variability and change.

We have written this book to meet the widely expressed need amongst practitioners for a comprehensive tool that will support practical adaptation interventions. If you are engaged in supporting members of communities affected by rapid environmental or other forms of disruptive change, this book will provide you with useful insights and practical approaches and tools that can be used to enable them to adapt more effectively.

The approach taken in this book is rooted in Participatory Action Research (PAR), which recognises that the people who are affected (in this instance) by climate variability and change are not only primarily responsible for determining and implementing responses within their own enterprises and communities, but also have a right to do so. If they are enabled to do so with the benefit of suitable technologies, accurate information, state of the art predictions and supportive institutions, they are far more likely to do so in ways that are effective and appropriate. PAR enables people to engage in iterative processes of reflection, learning, planning and action that broaden and deepen their abilities to respond to change, and enable them to participate more completely in managing their own affairs now and in the future. As such, this approach to adaptation to climate change is not dependent upon external risk assessments, but rather seeks to enable people to assess and respond to the risks that they themselves perceive. In this context communication of information relating to changing climatic patterns and their likely impacts is a crucial input into local level adaptation processes.

The book is organised into discrete sections to make it easy to access and use the information and tools that will be best suited to your needs and requirements at different stages of conceptualising, planning and implementing adaption processes and interventions.

Section 1 sets the scene for adaptation interventions by providing an overview of climate science, introducing concepts of ethics and values in addressing the climate challenge, providing some theoretical foundations in terms of development and adaption, and examining the significance of participation in adaptation processes.

In **Section 2** we provide a step-by-step practical guide to planning and implementing adaptation interventions. This section will be most useful for practitioners and planners with responsibility for initiating and supporting adaptation interventions.

In **Section 3** we provide access to some documented examples of processes in which local communities have engaged in action to enhance their resilience in the face of climatic variability and extreme weather events.

Section 4 provides a selection of tools that the practitioners can draw on when planning or facilitating an intervention. The set of cards that accompanies the book can be used in the design and implementation of major interventions as well as in their component parts (such as planning specific meetings or workshops). They provide easily accessible and practical guidance for the design and facilitation of processes and exercises.

You will note that we generally refer to processes, and not projects. Projects have a fixed timeframe and a limited budget, whereas adaptation processes in the context of individuals and communities are on going and should not necessarily be limited by a cut-off date. Whereas NGOs and community-based organisations might have to use projects as the vehicle for providing a framework and resources for adaptation actions, the duration of the process will inevitably be longer term, especially if it is successful.

We trust that you will find benefit in using this resource, and welcome any feedback that you may like to give us.

1.2 CLIMATE SCIENCE

A few decades ago there was still some doubt as to whether the world's climate was changing. But today, with temperature measurements from over 17,000 weather stations around the world, and 10 orbiting weather satellites, the data is impossible to ignore. Surface temperatures are rising at an alarming rate and changes to rainfall and other weather patterns are evident. We tend to think that climate change is a new phenomenon. But fossil and ice-core evidence shows that the earth has gone through many periods of rapid and dramatic climate change. In the last 20 million years or so there have been regular ice ages lasting around 100 000 years, interspersed with warm inter-glacial periods of between 8 000 and 40 000 years. The last ice age ended about 18 000 years ago, so theoretically, we are due for another one. But what we see is the opposite. The world seems to be warming up, and what makes this dynamic different is that it is not a natural cycle, but is linked to human activity – as will be explained below.

GLOBAL WARMING AND CLIMATE CHANGE

The terms global warming and climate change are often spoken of together. This is because they are intimately linked. Global warming relates to observed increases in the average global land and sea surface temperatures. For example, the last century has been warmer than any other in the last 1 000 years. Of the twelve hottest years since 1850 (when accurate record-keeping began), eleven were between 1995 and 2006 (IPCC, 2007). The average global temperature is now 0.85ºC warmer than it was 130 years ago (IPCC, 2014). But this average figure disguises local variations. For example, mean annual temperatures in southern Africa have increased at 1.5 times the global average. Also, in most regions in South Africa, maximum and minimum daily temperatures have increased annually and the frequency of hot extreme events has increased, and that of cold extreme events decreased (DEA, 2013b).

How does global warming relate to climate change? The weather is something we expect to be constantly changing, but the general weather pattern or climate of a particular region is something we expect to be stable and predictable. This relative climatic stability over many thousands of years has allowed plants and animals to evolve into ecological niches (polar bears at the North Pole, camels in the Arabian deserts, etc.), and has allowed human society to shift from nomadic hunter-gatherer economies to settled agriculture-based economies. The predictable weather patterns that make up the climate of a region are determined largely by the amount of heat energy driving the weather system. The dynamic and complex interaction of winds, air moisture, evaporation rates, ocean currents and many other factors are all driven by heat energy, which is in turn reflected in surface temperatures.

WHY SHOULD WE WORRY ABOUT GLOBAL WARMING AND CLIMATE CHANGE?

Predicting tomorrow's weather is far from an exact science. So it is no wonder that predicting what temperatures and rainfall patterns we may see in the next 50 or 100 years is fraught with difficulty. This difficult job is done with the aid of complex computer-based models which use mathematical equations which try to model the relationships between things like air and water temperature, rates of evaporation, humidity, winds, etc. Key to accurate climate modelling is an accurate set of base-line data from weather stations describing the current situation. Where this data is lacking or unreliable, assumptions need to be made. Other key elements are the assumptions that are made to describe things like human population growth, industrial activity, changes in land use, etc. The limitations of models and the assumptions that need to be made mean that future predictions always come with in-built uncertainty.

Accepting these limitations, we can nevertheless make predictions. But as these become more specific (with respect to geographical area, timeframe, severity, etc.) they also come with a lower level of confidence and greater uncertainty. The 2014 IPCC report predicts (in its best-case scenario), that the earth's average temperature will have increased by 1.5°C by 2100. The worst-case scenarios predict a greater than 2°C increase with devastating consequences (IPCC, 2014) . While the temperature increase numbers appear to be small, their effects on the climate are enormous – for example the global average temperature during the last ice-age was only 2 or 3 degrees centigrade lower then it is now. In all scenarios studied, the IPCC predicts the surface temperatures will continue to rise, heat waves will occur more often and last longer, extreme precipitation events (i.e. storms and hurricanes) will become more intense and more frequent, the oceans will continue to warm and acidify, and sea-level will continue to rise (IPCC, 2014).

For southern Africa, the broad prediction is that the western regions will become hotter and drier, while the central and eastern regions will become hotter and wetter. Furthermore, where rainfall is predicted to increase, it is likely that this rainfall will occur in fewer, more sever events. The timeframe over which these changes will begin to be noticed is the next 50 to 100 years.

WHY IS THE EARTH WARMING? – THE GREENHOUSE EFFECT

At a simplistic level, planet earth is a large lump of rock floating about in space with a (relatively) steady temperature. We get light energy from the sun, and lose about the same amount of heat to the surrounding freezing-cold outer space (about -273°C). French mathematician Joseph Fourier calculated that this steady-state condition should theoretically be reached at a surface temperature of around -18°C, but clearly this is not the case. Fortunately for us certain atmospheric gasses (the so-called greenhouse gasses) ensure that the earth's surface is well insulated from the cold of outer space. The mechanism is somewhat like a greenhouse. Short wavelength energy (essentially light) from the sun penetrates the atmosphere and warms the surface of the earth. The warm surface of the earth emits long wavelength energy (essentially heat), much of which is "trapped" by the greenhouse gasses and retained, and a small amount lost to outer-space. The concentration of these greenhouse gasses in the atmosphere (akin to the thickness of the greenhouse roof and walls) is thus critical to maintaining the earth's surface temperatures that have been relatively constant

There are a number of greenhouse gasses (GHG) in the atmosphere in significant concentrations, the most familiar being carbon dioxide (CO_2). Also significant are water vapour and methane. Each GHG has a different "greenhouse effect" but to simplify things, all are given a carbon dioxide equivalence.

for many thousands of years. By comparison, our neighbouring planet Mars, with and atmosphere 100 times thinner than the Earth's is very cold. Venus with a thick atmosphere of 96% carbon dioxide is an unbearably hot 470°C.

THE CARBON CYCLE AND FOSSIL FUELS

Most of the carbon dioxide in the atmosphere arises from the respiration of organic life forms. Volcanoes and other non-organic sources make a relatively small contribution. Put simply, organisms (mammals, insects, plants, aerobic bacteria, etc.) breathe in oxygen, use this oxygen to "burn" their food to extract energy, and breathe out carbon dioxide as a waste product. When exposed to light, green plants also absorb carbon dioxide, water and solar energy, and with the help of chlorophyll (through a process called photosynthesis), create carbohydrates from which they build plant mass, and generate oxygen as a waste product. This plant matter ultimately becomes food for other organisms and this cycle, revolving around carbon as the basic building block for life-forms, continues. Oxygen production of green plants exceeds by far their carbon dioxide production. Animals and plants thus exist in a delicate and mutually beneficial arrangement. Huge amounts of carbon are stored in trees in the great forests, in the wide grasslands, in the bogs of the tundra and in the in the soil beneath our feet. The greatest carbon storehouse of all is the sea, which contains huge amounts of dissolved carbon dioxide gas. Some of this dissolved gas is used by sea creatures to build their calcium carbonate shells and skeletons. This exchange of carbon between life forms and carbon dioxide in the air and water is known as the carbon cycle. Nature's in-built checks and balances have ensured a relatively stable concentration of carbon dioxide in the atmosphere, and thus a relatively constant greenhouse effect for the last 650 000 years.

Some organisms do not "breath" oxygen but, break down carbo-hydrates through other mechanisms. Anaerobic bacteria, for example, produce methane (also a greenhouse gas) as a waste product. Other bacteria get energy from breaking the molecular bonds of certain chemical compounds.

A part of the cycle where carbon is "captured" and stored for more than just the short--term is known as a carbon sink. Additional carbon is introduced into the cycle from a carbon source.

But 350 million years ago, during the Carboniferous Period, the earth was a very different place. Evolution had produced trees built from lignin fibre, but had not yet produced the fungi and bacteria able to break down this complex carbohydrate. Levels of carbon dioxide in the air were many times higher than they are today and the global climate was generally warm and humid. Large parts of the planet were covered in shallow swamps densely populated with ferns, mosses, and primitive trees. In

the in the warm shallow seas and lakes, algae and swamp loving bacteria thrived. Through photosynthesis, these green plants removed many millions of tonnes of carbon dioxide from the atmosphere (and from the natural carbon cycle), and in turn added vast amounts of oxygen to the atmosphere. Like all living things they died. Some did not decompose but settled to the bottom of the bogs and swamps. Over millions of years, the remains of these partially decomposed organisms, and the carbon they contained, were covered over with earth, compressed and fossilised.

Trees became coal and swamp sludge became oil. Some decomposition produced natural gas (largely methane) and, where the geology was favourable, this was trapped in porous rock structures. These high-carbon content materials represent a highly concentrated form of energy and for obvious reasons are known as fossil fuels. In addition to carbon removed from the atmosphere, marine organisms such as molluscs and plankton extracted dissolved carbon dioxide and used it to build their shells and skeletons by converting it into calcium carbonate (CaCO3). This also became fossilised into what we now call limestone, a key ingredient in the manufacture of cement.

CHANGES TO THE CARBON CYCLE

Carbon dioxide makes up a tiny proportion of all the gasses in the atmosphere. But even a tiny amount can equate to a significant greenhouse effect. A sample of air taken in 1769 when James Watt patented his coal-fired steam engine would have found that carbon dioxide made up approximately 0.028% or 280 parts per million (ppm) (Wilson & Law, 2007). And it had been roughly at that level for many thousands of years. While the invention of engines powered by coal, petrol, diesel and oil, freed us from the constraints that came with energy provided by human and domestic muscle, it also resulted in huge additions to the carbon cycle.

When any carbon-based fuel (wood, charcoal, coal, oil, methane, ethanol, etc.) burns, it combines with oxygen to produce heat energy, various nasty pollutants and carbon dioxide. When burning fuel such as wood or charcoal, the carbon added to the carbon cycle is simply carbon that was removed from the same cycle 30 or 40 or 100 years ago. Similarly with fuels like ethanol made from fermenting sugar cane or another agricultural crop. These are often called renewable fuels because it is possible to plant a tree for each one cut down and burned. With renewable fuels, there is no net increase in atmospheric carbon over the long term. But burning fossil fuels and making cement adds carbon that has been buried under the ground for 300 million years or more. It represents a net addition to the carbon cycle. Since there is no prospect of “new” coal being formed, these are also called non-renewable fuels.

At the start of the Industrial Revolution the concentration of carbon dioxide in the air was 280 ppm. By the late 1950s it stood at around 317 ppm. By 2005 it had reached 379 ppm, and by 2014 was still steadily climbing, along with other greenhouse gasses (GHG) like methane and nitrous oxide. The source of this steady increase is undeniably linked to human activity. The emissions level of these anthropogenic GHG emissions in 2010 stood at about 49 Gigatonnes CO2 equivalent per year (IPCC, 2014), and climbing. Just how much is this? A fully-grown male African elephant weighs about six tonnes. Thus every year we pour carbon dioxide into the atmosphere equivalent in weight to more than eight billion African elephants! Of the total additional GHG emitted between 1750 and 2011, about half was generated in the last 40 years of that period.

A key component in the cement used for mortar and concrete is produced by burning limestone to convert it into unslaked lime with carbon dioxide as a by-product. If fossil fuels are used as the heat source, then every tonne of cement produced releases close to a tonne of carbon dioxide into the atmosphere. In addition to burning fossil fuel and limestone, agricultural practices and changes in land--use contribute around 10% of total GHG emissions.

GREENHOUSE GASSES

Some greenhouse gasses (GHGs) are naturally occurring and some are man-made. As noted earlier, these gasses ensure that the earth remains at a comfortable and stable temperature. Our concern is with the steady increase in these gasses. Each GHG differs in its potency (global warming potential or GWP) and its longevity (some of them break down or react with other gasses). To simplify things, scientists use carbon dioxide as the standard benchmark against which to compare the others (the so-called carbon dioxide equivalent or CO2e) in terms of their global warming potential.

Water vapour is also a GHG. But exactly how its concentration in the atmosphere will change in relation to other environmental changes is largely unknown. Other significant greenhouse gasses found in the atmosphere are:

- Methane (CH4) occurs in relatively small concentrations and breaks down relatively quickly, but has a global warming potential 23 times that of carbon dioxide. Before the industrial revolution, methane was present at 715 parts per billion (ppb). This has now more than doubled to 1,774 ppb. Human induced emissions include releases from mining, oil drilling, intensive agriculture, forest clearing, etc.
- Nitrous oxide (NO2) is a by-product of fertiliser manufacture and the incomplete combustion of fossil fuels

- Sulphur hexafluoride (SF6) is used as an insulator for circuit breakers, and is a potent and long-lived GHG with a GWP of 22,200 over 100 years, but luckily it occurs in very small concentrations
- Chlorofluorocarbons (CFCs) and halocarbons (HFCs, PFCs) are synthetic chemicals originally made for refrigeration and now banned in many countries because of their effect of destroying the ozone layer
- Ozone itself is a greenhouse gas when it occurs in the lower atmosphere – as opposed to the stratosphere where it protects us from UV rays.

SOME POTENTIAL EFFECTS AND IMPACTS OF GLOBAL WARMING AND CLIMATE CHANGE

Predictions of the future are fraught with difficulties. Firstly, the climate system is extremely complex and not entirely understood. Secondly, we can only speculate about the impacts that a changing climate may have on our lives and the planet in general, although it is already clear that some parts of the world will be impacted far more severely than others. Finally, the rate and extent of change and consequent impact will depend partly on our future fossil fuel consumption and the efficacy of adaptation measures. But here are some aspects to consider:

Food security is one of the greatest areas of concern. Ten thousand years of relatively stable climate has allowed agriculture to develop to the point where it can provide sufficient food for a global population of many billions. Changes to temperatures and rainfall patterns, more frequent droughts and floods and such like, will influence crop yields and suitability. Farmers may have to switch crops or countries may have to rely more on food imports. Agricultural pests and diseases may move into new regions, or will become more of a problem. Heat stress on farm animals may also lower productivity. If changes are slow and steady, farmers and agricultural researchers may have the time to develop new more resilient varieties.

Sea-level rise is of particular concern for low-lying islands and coastal regions and is caused by both the expansion of water and the melting of polar ice caps and glaciers. Sea-level has already risen by about 17 cm over the last 100 years, and the IPCC (2014) estimates a rise of between 26 cm and 55 cm by the end of the century. Coastal flooding already affects about 48 million people each year, and about 40% of the world's population lives within 100 kilometres of the coast, and over 100 million people live less than a metre above sea-level (Wilson & Law, 2007).

Health is another concern. Climatic changes may lead to the spread of certain pests and diseases, such as malaria, bilharzias, tick-borne parasites etc., into new areas Water-borne diseases such as typhoid, cholera and dysentery thrive in floods; and droughts bring diseases associated with poor water quality and lack of sanitation. Health-vulnerable people may suffer further because of heat stress. Specific impacts are hard to predict, but it is likely that poor people who lack access to health care are likely to be worst affected. Health will also be indirectly impacted by other climate impacts, such as food shortages.

More frequent **extreme weather events** such as hurricanes, tornados, floods and droughts are predicted, and we are all familiar with their devastating consequences. Impacts on property, lives and productivity could be reduced by effective early-warning systems, and disaster response strategies. Significantly, many large insurance companies are now refusing to cover flood and storm damage.

Fires are also predicted to increase in some regions because of higher temperatures and drying-out of the natural vegetation. Negative impacts will arise from damage to life and property, crops, smoke damage, etc.. Wild fires also release millions of tons of carbon dioxide into the air, thereby increasing global warming and the probability of more fires.

Our planet's **biodiversity** has evolved over thousands of years of relatively stable climatic conditions with different species adapting to different conditions and habitats – some wide-ranging and others extremely specialised. Gradual changes in the climate will result in some species migrating to new areas, or simply disappearing. Small but significant habitat shifts have already been observed and attributed to a changing climate. We can expect habitats to shift towards the poles, and towards higher altitudes. Ocean ecosystems will also be affected given the huge amount of heat energy absorbed by the oceans, and the increasing acidification. Some scientists estimate that global warming may cause the extinction of between 15 and 37% of all plant and animal species by 2050 (Monbiot, 2006).

Water has a high propensity for absorbing carbon dioxide and the world's oceans act as an enormous carbon sink. But dissolved CO2 also makesm the water more acidic which can affect marine life.

Humans depend in many critical respects, on the natural environment, or so-called ecosystem services. While it is hard to quantify, loss of biodiversity will have a significant impact on human society. On the other

hand, the increase of carbon dioxide in the atmosphere has a positive effect on green plants, which depend on it for their growth. With the carbon dioxide uptake by plants becomes more efficient as carbon dioxide levels rise. Since plants inevitably lose water with every uptake of carbon dioxide, they become more water-use efficient. Consequently, for green plants the carbon dioxide increase may to some extent compensate for the disadvantages of temperature increase and drying of the environment.

1.3 CLIMATE ETHICS AND VALUES

WHO IS TO BLAME?

Many environmental pollutants have a local or perhaps regional impact. Climate change is different. Irrespective of where in the world greenhouse gasses are released, their impact is felt globally. Also, in determining responsibility, one needs to look at cumulative historical emissions, not just what countries are emitting now. The so-called developed countries began to burn fossil fuels with the industrial revolution in the 1800s. In fact this phase of rapid industrialisation would not have been possible without this relatively cheap and concentrated source of energy.

The biggest culprit countries in terms of cumulative historical emissions (dating back to 1850), are predictably, the USA, China and a number of European countries, although the top twenty also includes some so-called developing countries (India, South Africa, Mexico and Iran). But obviously large countries will generate more emissions, so a more accurate picture emerges when one looks at per-capita emissions (i.e. emission per person). Topping the list is Luxembourg and the top twenty is made up almost entirely of North American and European countries. China, because of its large population, drops down to number 80 on the list.

Industrialised countries could argue that they didn't know of the global warming effect that fossil fuels would have. But the reality is that scientist began raising the alarm, and governments began listening as far back as 1979. The situation was serious enough in 1988 for the World Meteorological Organisation to establish the International Panel on Climate Change (IPCC). And in 1992 at the Rio Earth Summit, over 100 countries signed the United Nations Framework Convention on Climate Change (UNFCCC). But despite this, carbon emission from developed countries has continued apace, with some even increasing their carbon emissions.

On this basis, there is some justification for arguing that rich countries are largely to blame for the looming crisis and so must take more responsibility for its solution. But in real-politik, it is money and power that counts. Moral arguments rarely hold sway.

WHO IS MOST AT RISK?

The significant primary impacts of global warming are changes in rainfall patterns, temperatures, and sea-level. With respect to sea-level rise, it is obvious that small-island states and low-lying countries are most at risk, especially those that are less wealthy and cannot afford to construct expensive sea walls. With respect to changes in rainfall patterns, broadly speaking, wet regions are likely to get wetter, while dry regions will become drier (IPCC, 2014). Extreme precipitation events will likely become more intense and more frequent (IPCC, 2014). With respect to surface temperatures, the greatest warming is predicted for tropical zones and for the Northern Hemisphere sub-tropical regions (IPCC, 2014). For southern Africa, models project the average temperatures as being at least 2 degrees higher than the global average, and inland regions will experience greater temperature increases than at the coast, where the sea has a moderating influence (DEA, 2013a).

Whatever the specific changes may be in different parts of the world, actual impact will depend largely on the area's economy base, their ability to adapt, and their resources to do so. Countries with an economy heavily reliant on agriculture will obviously be hard hit, particularly where there is also relatively poor infrastructure, extension support, and research and development capacity.

WHAT NEEDS TO BE DONE?

International climate change negotiations at the United Nations Framework Convention on Climate Change (UNFCCC) make a distinction between mitigation and adaptation in discussing what needs to be done, who needs to do it, and how it will be funded. In terms of mitigation, the demand is simple. Current levels of greenhouse gas emissions must be drastically reduced. The size of this reduction and which countries will make the necessary cuts, is invariably where negotiations fail. Most countries' economies are so intimately dependent on cheap fossil fuels that it is very hard for any government to significantly reduce greenhouse gas emissions without hurting their economy – and any political leader who advocates inflicting damage on their own economy will have a very short career! This is despite a range of commitments that various countries have made over the more than 20 years since climate negotiations began. Perhaps the most significant commitments are contained in the Kyoto Protocol, which entered into force in 2005. The Kyoto Protocol recognised that developed industrialised countries had to be first to make cuts in carbon emissions. It defined who these countries were, and what cuts they agreed to make against a defined baseline. Significantly, the biggest carbon emitter, the USA never signed Kyoto, some like Canada and Australia have since pulled out, and it seems that most other signatories will simply ignore their pledges.

Carbon trading was set up as a more attractive mechanism to reduce emissions. On paper it is a simple mechanism where entities which find it too difficult or too expensive to reduce their own emissions simply pay for emissions cuts elsewhere where it may be easier or cheaper, and then take the credit. In practice, the system is fraught with difficulty and open to abuse, and whether it has led to any appreciable overall cuts in carbon emissions is debatable.

Adaptation discussions at the UNFCCC have tended to be much less politically charged because they do not demand that rich countries make radical changes to their economies. Here, the issue is largely around the question of finances. It is broadly accepted that poor countries face the biggest impact yet carry the least blame for the problem, and so rich countries should finance their adaptation efforts. The UNFCCC's Adaptation Fund was officially launched in 2007 to fund adaptation efforts. The big difficulty is in reaching agreement about how much each contributing country will provide, and who gets to control the Fund.

WHAT IS ADAPTATION?

The term “adaptation to climate change” is a broad catch-all that covers activities to prevent or lessen the negative potential impacts to society of changes to the climate. These could include, for example:

- Infrastructure – flood-proof bridges, harbours that accommodate sea-level rises, dykes and levees to prevent flooding, more robust communication systems, rapid disaster response units, etc.
- Policy and legislation – land-use planning regulations that prevent settlements in flood-prone area, drought relief measures for farmers, urban water restrictions, etc.
- Research and development – drought-resistant crops, water-efficient industrial processes, etc.
- Changes in the ways people live and use resources – insulation of houses, planting of shade trees, utilising drought- and heat-resistant varieties of crops, migration away from areas severely affected by climate change.

This book focuses on just one element of adaptation, namely, Community-Based Adaptation. By this we mean a set of processes by which a group of people who live in proximity to one another and have some form of common identity and commitment work together in a participatory way to effect changes (internally or externally) which will lessen the negative impacts (or take advantage of positive impacts) of a change in their local climatic conditions.

It is worth at this point to provide some reasons why this is important. Firstly, we can assume that government, mandated to create and maintain the conditions for a functioning economy, will continue to do so in the face of a changing climate. Certainly, influential sectors of society will put pressure on government to maintain the economic status quo. If already large sections of society marginalised from the mainstream economy, it would be naïve to think that government will be in a position to effectively “come to their rescue” in the future. A large proportion of resources for adaptation will go first to the more powerful and influential. Existing social and economic fault-lines will simply be exacerbated by unexpected and unpredictable changes to the climate. But more to the point, we need to work towards a society where marginal communities become more self-sufficient and resilient in the face of change, and become less dependent on government support. Even if a climate change adaptation programme does not fundamentally change the economic position of a community, it can go a long way towards building that community’s sense of self, confidence, self-reliance and problem-solving capacity – and ultimately, their ability to continue to thrive despite changes to the climate.

Community-based climate change adaptation is often used together with related terms like “community resilience”, “risk-management” and “vulnerability”. All of these terms have a specific meaning, sometimes contested in the literature, and may have a different shade of meaning depending on the context they are used. We have provided a Glossary of Terms to help you navigate your way through the literature, and to clarify in what sense we use these words.

Finally, we should make it clear that the kind of community-based adaptation we are advocating is very closely linked to good development and community-building practice. Many of principles and practices are shared and the outcomes may be the same. The fundamental distinction is one of focus and departure point. For example, one outcome of a climate change adaptation process may be plans to send members on a training course on how to use computers. On the face of it, this seems to have little to do with adapting to climate change. On the other hand, it is easy to see, from the community-members’ point of view, how computer-literacy will help them get better access to information, keep records, communicate, find employment, etc. All of these capacities put them in a better position to grow and prosper despite future changes. As you will see from further sections, we advocate strongly for processes that encourage the community to “own” their own development process. One consequence is that you, as a facilitator or provider of resources, cannot control the decision that the community group take. Another consequence is that decisions and action-plans will tend to focus on the community’s immediate challenges – rather than ones which are reflected in scientific predictions and which may or may not be noticed in the next 50 or 100 years. Mostly these are too vague to plan actions around, particularly when those actions require an investment of effort or resources. An ideal adaptation process will identify current challenges that, if addressed, will build the capacity of the community to prosper in an increasingly uncertain future.

1.4 DEVELOPMENT AND ADAPTATION

SUSTAINABLE ADAPTATION RESPONSES

We understand development to mean improvement in the quality of life of people and reduction in material and other poverties. According to Max-Neef (1991), the “best development process will be that which allows the greatest improvement in people’s quality of life.” Quality of life depends on the possibilities people have to adequately satisfy their fundamental human needs.

The 1987 Brundtland Commission report to the United Nations, entitled “Our Common Future”, outlined a vision for sustainable development on a global level that could address common concerns and meet the needs of the present generation without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities. But technology and social organization can be both managed and improved to make way for a new era of economic growth.

The Commission proposed that widespread poverty is no longer inevitable, and that many problems of resource depletion and environmental stress arise from disparities in economic and political power. Poverty is not only an evil in itself, but sustainable development requires meeting the basic needs of all and extending to all the opportunity to fulfil their aspirations for a better life. A world in which poverty is endemic will always be prone to ecological and other catastrophes.

The Brundtland Commission Report laid the foundations for the United Nations Framework Convention on Climate Change (UNFCCC) and many other global environmental agreements.

We understand adaptation as a vital aspect of sustainable development. Successful adaptation will not only contribute to development, but will also reduce the risks to which people are exposed and minimise the damages and losses that they may suffer in the future as a result of climatic impacts. Adaptation is nothing new to the human race, which has been adapting successfully to different and changing environments as it evolved. Rapid change in the modern age has stimulated people to adapt faster than ever before. Each person adapts to changing circumstances in her or his own way, influenced by culture, knowledge, belief systems, ambitions, economic opportunity, etc.

Adaptation is thus something that each of us understands and goes about in our own way. As external circumstances change, or the ways in which we choose to satisfy our needs evolve, so we find new ways of doing and experiencing the world, individually or collectively within our group. The impacts of some of these new ways of doing things may either be untested, or people may lack access to information that would allow them to choose more sustainable alternatives. Effective adaptation responses cannot be uncoupled from sustainable development processes. Pelling (2011) points out that adaptation is a dynamic phenomenon (and therefore rather a process than a status), and notes that adaptation activities cannot be separated from other activities.

To further complicate things, in the context of climatic change we are often not entirely sure what we need to adapt to. Nevertheless, climate change is a reality that people everywhere on the planet have experience of and live with (either in the experiences of their daily life, or virtually through media coverage of extreme weather events). “Climate change is no longer an external threat to be managed ‘out there’, but is an intimate element of human history – both and outcome and a driver – of development decisions for individuals, organisations, and governments” (Pelling, 2011).

NO-REGRET APPROACHES

Adopting a “no regrets” approach will strengthen confidence in adaptation interventions and encourage people to invest in them. ‘‘No-regret’’ adaptation measures are designed to deliver benefits even if the anticipated climate change impacts do not occur. In other words, if people or governments plan and take action to adapt to climate change, these actions will result in improvements that will enhance the quality of people’s lives and reduce the risks to which they are exposed under any set of climatic circumstances. For example, land use practices that increase the amount of organic material in the soil will improve water retention and plant production in dry periods, while improving soil aeration and reducing erosion in periods of heavy precipitation. If the cost is reasonable, the land user will not regret having changed her or his practices no matter what the weather. Climate-proofing new buildings with improved insulation is also an example of a no-regret strategy, since this will improve the comfort of the inhabitants and provide savings on energy that can pay back the additional cost, even in just a few years.

Whether investing in an adaptation measure will, in fact, not cause people to regret the effort and investment involved in its implementation depends on the specific circumstances they find themselves in. For example, investing in additional irrigation infrastructure may be a no-regret measure in regions that already face water scarcity, but in regions that enjoy sufficient access to water the investment may only be seen as be beneficial if climate change decreases precipitation significantly.

It is important to understand why people and institutions may not implement no-regret measures that appear to make sense. The obstacles to adopting these measures may include limitations of finance or accessible technology, poor access to information, high transaction costs or institutional and legal constraints. Facilitation of adaptation processes should enable people to identify these obstacles, and to explore options to creatively overcome them.

MALADAPTATION

Not all adaptations successfully address the original stressor or limitation, and some create even greater problems in other areas. These sorts of responses are called maladaptations. The International Initiative on Maladaptation to Climate Change (iMACC)[1] defines Maladaptation as “an adaptation process that results in

[1] http://apmen.iom.int/en/m/editorials/item/102-avoiding-maladaptation-to-better-manage-climate-inducedmigration-in-asia-pacific

increased vulnerability to climate change and/or undermines capacity for future adaptation."
Solutions to the adaptive choices that face us are seldom simple. For example:

- In an urban setting, if the quality of water available in our taps deteriorates as a result of climate or other changes, we might take to drinking filtered water, or to buying bottled water. Both options will ensure that we do not get sick from drinking bad water.
- In a rural village, the amount of clean drinking water available from the springs might be reduced by climate impacts. Collective strategies to adapt to this change could include restricting access to the springs, charging money for water used, or filtering water from springs not currently considered safe to use.

In either of these cases the affected community would need to assess the relative chances of success of the strategy adopted in terms of its own criteria. To avoid maladaptation, these should include elements such as cost, equity, access, convenience, environmental impact, aesthetics and carbon footprint. Some options might seem appropriate in the short term, whilst having negative long-term consequences. For example, if access to the water from the spring were to be limited to those who could afford it, the negative impacts would include ill health for the less wealthy, "criminal" responses by ordinary people claiming the rights that they had previously enjoyed and social disruption from protest action. In terms of the wider implications of the choices made, if everyone on the planet could afford to switch to drinking only bottled water, the impact on the environment would be astronomical. This would clearly be an unsustainable approach, and therefore "maladaptation".

Some of the negative impacts of adaptations are not apparent when they are first initiated, but only become clear over time. This is one reason to monitor processes and their impacts, and to evaluate to inform future plans and enable people to adjust the course of action as needed.

SUSTAINABLE ADAPTATION MEASURES

Eriksen et al (2011) define sustainable adaptation measures as those that "…contribute to socially and environmentally sustainable pathways, including both social justice and environmental integrity". Here are some aspects to consider in designing processes for sustainable adaptation:

Multiple stressors: Adaptation work is often targeted at poor communities since they are generally very sensitive to even small shocks and stresses. However changes to the climate may be the least of these, and

narrow adaptation interventions may not lead to a reduction on poverty or inequality, thus not addressing fundamental vulnerabilities. A broader approach is predicated that enhances resilience in multiple ways.

Values, vested interests and equity: Groups and communities which may appear from the outside to have coherent values and interests seldom really do. Poorly managed interventions may bring these different interests and values into direct conflict and block progress. Furthermore, actions that benefit some (e.g. men, land-owners, etc.) may come at a cost to others (women, landless people, etc.). A transparent process that recognises and works with these differences on the basis of explicit and agreed values has a greater chance of being sustainable. In this context Community-Based Adaptation provides an approach and a set of tools that address issues of common interests and enable communities to mobilise resources and take actions at a larger scale.

Importance of local knowledge: There is often a tendency to give more credence to knowledge which has been generated by science or by "experts", at the cost of the knowledge that comes from a local "lived experience". Affected communities may be conditioned to think that their knowledge, experience and judgement are inferior to the "scientific truth". This can create an unhealthy dependence on knowledge and proposals generated outside the communities, based on analysis that people cannot understand, and cause people to mistrust their own judgement, which in turn will undermine agency and initiative on their part. On the other hand, anthropogenic climate change is a novel phenomenon that can probably not be predicted on the basis of traditional knowledge. Scientific measurement and predictions have a crucial role to play in enabling people to anticipate future climate. A sustainable adaptation process will thus integrate local knowledge with knowledge from other sources.

Wider implications and feedback loops: The impacts of climate change are global, but also temporal – affecting current and future generations. Adaptive responses to benefit one particular group in a particular location must be sensitive to the impact that response may have on other situations or into the future. For example, technology which improves access to water in one area may disadvantage those living downstream. Adaptation responses that contribute to higher levels of atmospheric greenhouse gasses should be avoided, whereas those that also reduce emissions or capture atmospheric carbon should be embraced.

Participation and transformation: In order to enhance their sustainability, and the sustainability of the adaptation measures that they implement, communities need to address the social ills of alienation, discrimination, inequality, abuse of power, impoverishment and injustice in holistic ways, and to transform the ways in which individuals and social groupings interact. Fuller participation of all members of a community in its social, economic and political life is linked to their ability to shape decisions in ways that will improve their positive impact and limit negative consequences. Participation is also closely associated with people's ability to act positively in ways that will bring about desired change. We refer to this quality as "agency". Agency derives not only from knowledge, skills, abilities and access to tools and resources, but also to empowerment, which enables people to draw all of these together and to act positively (even in the face of adversity).

1.5 PARTICIPATION

PARTICIPATORY ACTION RESEARCH AND COMMUNITY-BASED ADAPTATION

The impacts of climate change are imperfectly known, and many people have imperfect access to and understanding of what is known globally. People affected by climate change, especially the less wealthy, must carry on with their livelihood activities whilst attempting to adapt these to changing circumstances. Starting from an unclear baseline, they must constantly adjust what they are doing in the light of emerging realities and impacts, and what they are learning about what improvements they can bring about and what negative impacts they can mitigate against. Adaptation can thus be understood as a process that requires "learning while doing" in a shifting environment. In order to support this process in ways that are ethically sound, Participatory Action Research (PAR) is a methodology that is well suited.

As the name implies, PAR in an inclusive approach in which all participants are seen and treated as partners at each stage of the learning process, from identifying the research questions, thorough testing alternative approaches and gathering data to analysis and drawing conclusions. Participation in the process by everyone

who is affected and has an interest in the outcomes is not only practical, but also ethical, as ownership of process and outcomes are shared.

PAR is action-oriented in that is seeks to change situations and relationships that are perceived as being sub-optimal or oppressive at the same time as participants are analysing and learning more about these situations and relationships from new perspectives, and with new tools.

The research within PAR is a cyclic process of learning, alternating action with critical reflection, and modifying plans in the light of the emerging knowledge. Although the conceptualisation of PAR might seem complex or intellectually challenging, the process is one that is readily accessible to all, old and young, literate or not, as are the outcomes.

PAR does require long-term commitment on the part of all, and in particular facilitators from outside the community, as it is an iterative process that will only deliver value over time. It is not well suited to short-term interventions: but we would argue that short term interventions are generally not suited to nurturing adaptation.

Community-Based Adaptation is an approach and a set of tools that address issues of common interests and enable communities to mobilise resources and take actions at a larger scale. Much of the innovative work in developing CBA has been led by the International Institute for Environment and Development (IIED), which promotes an action research approach that extends the life of interventions beyond the normal project funding cycle (usually up to 5 years), and enables effective response to climate change impacts, which unfold unpredictably over long periods of time. CARE (2010) describes the primary objective of Community-Based Adaptation interventions as being “to improve the capacity of local communities to adapt to climate change.” From CARE’s perspective, “effective CBA requires an integrated approach that combines traditional knowledge with innovative strategies that not only address current vulnerabilities, but also build the resilience of people to face new and dynamic challenges. It also aims to protect and sustain the ecosystems that people depend on for their livelihoods.”

SOME ETHICAL CONSIDERATIONS FOR PARTICIPATORY WORK

Rowley et al (2013) and Absalom et al (1995) explore some ethical issues to consider when facilitating participatory processes of all kind, and which are equally applicable to PAR.

WHOSE PROCESS IS IT?

The ultimate aim of a Community-Based Adaptation process is to empower the community as a whole. The process will probably require people to invest time, energy and resources (financial, physical, emotional, social) and the outcome may result in some unwelcome changes in the lives of the people in the group. An ethical approach acknowledges this, invests full ownership of the process in the hands of the group and strives to ensure that decisions are made on the basis of the best available information, in the full realisation that the costs, benefits and outcomes will be theirs. The facilitator's role is to steer, advise and assist. This involves "holding the space" so that open and constructive discourse and other forms of interaction can take place, and ensuring that all voices are heard (especially those of the most marginal and vulnerable). It does not imply that the facilitator should direct or control. Remember that the facilitator can usually walk away from the process and its results at any point, while the participants have to live with the consequences.

Community ownership of the process means in practice that all activities and plans are developed by the participants themselves – using their analysis, their ideas and their words. If the facilitator believes that the goals and plans are inequitable, unworkable or unsustainable, she or he has a duty to make people aware of this, and the likely consequences. However, there is no guarantee that the participants will come to share this perspective. The facilitator is not always in control of the process or its outcomes, and must be willing and able to take a calculated risk that good sense will prevail. If an intervention is heading in a direction that the facilitator cannot ethically support, the facilitator should explain why this is so, if need be withdraw support, and accept that the consequences will not be optimal.

RELEVANCE

It is important to explore issues and questions that are relevant to community members (even if some do not initially see the relevance, or would rather avoid uncomfortable topics). If the facilitator introduces topics that are not perceived to be important, people will probably not engage with, or stay with the process. However, because the facilitator is likely to have some perspectives and knowledge that are unavailable within the

community, s/he does have an important role in stimulating discourse, introducing new information and concepts where they have relevance to the concerns of the community and challenging orthodoxies that may hinder adoption of useful new ideas or technologies.

OWNERSHIP AND COMPENSATION

It is common practice in many parts of the world that development agents provide compensation to participants in processes such as workshops. This practice has become deeply embedded in some areas, and it is difficult to entice people to participate without cash incentives. However, such incentives tend to undermine agency on the part of local communities, and skew the motivation of participants away from seeking to attain their own development or adaptation goals, and towards earning an immediate income. For this reason, as a general rule, no compensation should be paid for attending workshops or learning events. If the questions are relevant and there is ownership of the process, it should not be necessary to compensate people for participating. On the other hand, if demands for compensation threaten to prevent the process from going forward, it may be that it is starting on the wrong footing, and should be re-initiated or even abandoned.

In some cases it is entirely appropriate for people to be compensated for the contribution of their time to processes that are intended to benefit the broader community. Implementing participatory research processes on behalf of the community may take a lot of time and effort, and prevent people from undertaking the work that would otherwise earn them a living. In cases like this a wage can also reflect recognition of the contribution of the individual to the community and the value of the professional task performed by the community-based researcher. In such cases it will be important to ensure that the wage offered is reasonable in terms of community norms, to minimise possible jealousy or hardship. Most importantly, the compensation arrangement should be the result of free and open discussion by the participants.

COMMITMENT

An adaptation process should lead to direct but sustainable improvements to the participants' situation. These can be achieved via changes in the way people do things or use resources on the ground (e.g. improved farming practices, innovative technology, etc.); changes to institutional arrangements or their effectiveness (e.g. new local social structures, more effective support from government extension, etc.) or shifts in policy

that have a local impact. These sorts of impacts are not achieved overnight. Ideally the process will be an iterative one that takes place over an extended period of time, and thus requires a commitment to building a long-term partnership even while acknowledging that this always constrained by funding limitations, the facilitator's own capacity, etc.

One-off exercises should be avoided, even with the best intentions. Because they are not informed by any in-depth understanding of the context or the people, such interventions tend not to lead to any real learning (except perhaps a learned distrust of outsiders with good intentions). One-off interventions also seldom create enhanced capacities within the broader community, and do not leave any lasting legacy which the community can build on. On the contrary, they usually end up benefiting only the already advantaged members of a community, which exacerbates problems of inequity of resources and power. Underlying tensions within the community emerge but are left unresolved, and all too frequently the turf for future work in that community is spoiled.

What Pelling (2011) describes as "transformative adaptation" is an on-going and evolving process that needs time, and is thus beyond the normal project timeframe of a few years.

A LEARNING APPROACH

The tangible results of a CBA process may well be some or other technical or institutional advance, such as a change in farming practices, a new water supply system, a registered community organisation, etc. However, it can be argued that these visible changes are less important than (and in fact emerge from) the group's deepened understanding of their situation and their environment, and their enhanced capacity to take action.

A learning approach is by its nature organic, cyclical and reflective. People cannot be "forced" to learn things, and for learning to "stick" it needs to be linked to action and reflection. The outcomes of each step in the process are reflected on, examined and discussed; and this helps participants to decide on the next step. When adults are involved, a learning approach cannot easily work unless the facilitators also approach the process with the intention to learn (Pelling, 2011).

With sound facilitation, reflection on and learning from achievements and successes (including the challenges that had to be overcome on the way there) is readily accessible to people who participated in the process. However, failures offer equally rich (although usually less accessible) opportunities for learning. We tend to be ashamed of failure, and to become tangled in a web of blame and guilt when contemplating its causes. It is thus important for a facilitator to strengthen mutual trust and create a safe space before asking people to examine failures. Difficult as this may be, learning from failure is often absolutely essential for advancing effective adaptation on the community level.
Learning from failure also provides important learning opportunities for the self-aware facilitator to learn how to effectively facilitate empowering adaptation approaches.

DISCLOSURE

In an ethical approach, the facilitator or originator of the CBA process is open and honest about his/her intentions, funding sources and amounts, mandate, constraints and own vested interests. Participants need to clearly understand why and from where the initiative arose, why they were “chosen”, who the other stakeholders are, and what investment the process may require of them.

In turn, individual participants should be encouraged (throughout the process) to express why they are participating, what they are getting out (or hope to get out) of the process and what their constraints and limitations are.

Open and honest disclosure is essential to building trust between the group and the facilitator and between participants themselves.

NOTHING ABOUT US WITHOUT US

Linked to the requirements for disclosure and ownership, an ethical approach would require that the group controls how information about the process is used. Notes, minutes, photographs, interviews, reports to donors and other documentation on the process should not be shared without prior approval of the group, and without appropriate credit where due.

Similarly the involvement of “outsiders”, such as observers, visiting donors, students, researchers and journalists needs the group’s prior approval. If there are any terms or conditions set, these must be clearly communicated to the visitors.

WHO PARTICIPATES?

It goes without saying that participation in adaptation processes is voluntary. However the facilitator, with the group, should make sure that as far as possible everyone relevant to the process is included, and that their voices and ideas are equally heard. This may clash with certain cultural norms (for example where men are traditionally the community decision-makers) and may call for a sensitive approach and the redesign of the process. For example, it may be appropriate to facilitate discussions in separate sub-groups (women, youth, etc.) which link with the broader community process so as to enable the specific concerns of more marginal groupings to emerge.

There may be a tension in some cases, between personal ethics of individuals in the group and the ethics of a sound participatory process. The group, or some within it, may express views (for example on race, sexuality, gender, or religion) that other members of the group or the facilitator may find intolerable. It is essential that these are openly discussed, and that an acceptable compromise is found. Establishing a team contract is one tried and trusted way of addressing issues of this nature.

The team contract: a tool to enhance performance and deepen trust and ownership

A team contract is a set of guiding principles or rules of behavior compiled by and agreed upon by the participants in a specific process that serves as a point of reference in the course of joint activities. When drawing up a team contract it is important to ensure that all participants feel safe to share their deepest concerns and ambitions relating to collaboration and achieving shared outcomes. Also, ensure that the process is one that is participatory and transparent, and that all are able to clearly see what is written up.

A simple way to draw up a team contract is to have the participants sit in a circle facing a facilitator who is equipped with a flipchart and a marker pen. Starting with the first to offer, then working around the circle giving

each participant a turn, ensure that everyone proposes an item for the draft team contract. Once all have had a turn, open the floor for further contributions.

Once all have been able to contribute adequately to the contract, the facilitator should review each point in turn, making sure that it is clear and that its intent is understood by all, and then asking all participants if they are willing to support it. Only once each point has been agreed to should the group be asked if they all endorse the contract. It should be made clear that if members of the team would like to amend the contract, opportunities to do so will be created. A team contract should never be seen to be "set in stone", or used to enforce discipline in a top-down manner.

At this point proposals can be shared and discussed relating to how best to ensure that the contract can be used to enhance the team's performance and the participation and enjoyment of its members. For example, a shared evaluative reflection on the team's behavior and performance at the end of each day is usually a good moment to review how well the team has kept to its contract, and to revise it if need be.

A team contract provides the opportunity for facilitators to "walk the talk" of participation and shared ownership of development processes.

1.6 RESOURCES FOR ADAPTATION

WHAT RESOURCES ARE MOST CRITICAL?

The best resources for any sort of adaptation process are those that people have already: their knowledge and skills, their cultural wealth, their intellectual capacities, the plant and animal genetic resources they manage, the tolls they use. These are all available to people at little or no additional cost, and are perfectly understood. They hold little danger of unexpected outcomes or challenges, such as those that all too frequently crop up with new or alien technologies introduced by outsiders. This is not to imply that new technologies do not have a vital role to play: only that they have limitations and disadvantages when compared to the utility, accessibility and affordability of local resources.

We live in a world besotted with the new, and seldom pause to consider that the hidden costs and long-term negative impacts of the latest technologies are frequently not yet known. Whether one thinks of the Chernobyl nuclear disaster, or of drugs such as Thalidomide[2] whose dangerous side effects only become known after many people had been affected by them, new technologies are fraught with dangers. Older technologies may not be very efficient or even safe, but the people who use them generally know what they are doing and are willing to take the necessary calculated risks in the light of their knowledge and experience.

Another reason why adaptation efforts do well to utilise local resources is that this approach is likely to enhance pride and self-sufficiency, and to strengthen the agency of members of rural communities to take the actions that are necessary. In climate-affected rural communities the people drive adaptation, not the resources and technologies. Indeed, when adaptation processes are driven forward from the supply side of technologies and funding, there is a real danger that they will not result in sustained improvement, and they might well undermine local resilience.

Despite the pre-eminent importance of local resources, many communities that are severely affected by climate change simply lack the resources necessary to adapt their livelihoods and lives to the additional challenges presented by climate change. An example to illustrate this is the farming and village communities of Bangladesh, which has been devastated with increasing frequency and severity by floods and typhoons. Additional resources are essential to enable the people of Bangladesh to strengthen their dykes and build flood-proof shelters.

Facilitators can create a sound basis for participatory planning processes with members of climate-affected communities by working with the members of the community to establish clear values and principles that they can agree to adhere to and be guided by. This will increase the likelihood that the adaptation process will be fully owned by local people, and will also enable all participants to generate their own tool for use in evaluative processes and future planning

[2] Thalidomide is an immunomodulatory drug that was initially used (amongst other applications) against nausea and to alleviate morning sickness in pregnant women when it was first released in 1957. Foetuses subjected to thalidomide while in the womb experienced limb deficiencies in a way that the long limbs either were not developed or presented themselves as stumps, and over 10,000 infants of mothers who took Thalidomide were born with phocomelia (malformation of the limbs). (http://en.wikipedia.org/wiki/Thalidomide)

FUNDING AND DONORS

Adaptation requires changes in the ways people do things and frequently in the technologies that they use. These changes frequently require additional resources, which in stressed communities are usually in short supply. Donor support is designed to bridge this gap, and in many instances it is appropriate for external facilitators to create or strengthen links between affected communities and potential donors.

Introducing externally provided resources into a resource-poor environment sets that stage for potential conflict over control of and access to these resources. If not well planned for, guided by a sound process and rooted in suitable local institutions, external resources can lead to conflict and can undermine the achievement of any improvement in the situation. People's values and local wisdom should be elicited, as well as their opinions about how allocation of resources will take place. Processes designed to ensure accountability for resources and their use should be proposed and agreed to between the community members and the resource providers or conduits (i.e. the development agent/ facilitator).

All too often projects of this nature are driven by the donor's desire to see "results". It is essential that the donor (and other influential stakeholders) understand the nature of participatory work, the need for legitimate local ownership, and the likelihood that the exact nature of tangible outcomes is unpredictable. However, this does not absolve facilitators from responsibility for honest accounting for activities and expenditures, for rigorously professional behaviour, and for the commitment to enabling direct improvements or benefits to the community. If the donor's expectations or conditions are not appropriate, the facilitator should help the community to articulate its position to the donor in a spirit of partnership. After all, donors want to see their funds used to improve people's lives, and will usually appreciate feedback of this nature.

Successful adaptation processes will usually generate a momentum that will include reflection on what further action and resources may be needed. This, in turn, may well trigger a further fundraising effort. As local institutions evolve, it will become more appropriate for these fundraising efforts to be undertaken in partnership with them, and for resources to be managed and allocated by them. Some of this further funding may not be for "adaptation" as it is commonly understood, but might be intended to address some of the other stressors such as market access or poor education. This is not merely legitimate, but laudable. After all, to succeed in its broad goals, the adaptation process should be an on-going one that continuously supports communities' growth, development and empowerment so that all of its members can fulfil all of their various human needs in ways that are mutually supportive.

SECTION 2: THE PROCESS

2.1 INITIATING THE ADAPTATION PROCESS

WHERE TO BEGIN?

Humans have a unique ability to adapt to changing circumstances, and have had to adapt to a changing environment (including climatic conditions) for millennia, in order to survive. But it is only in recent years that we have become aware of the need to specifically adapt to changes brought about by climatic conditions that are evolving with increased rapidity – not just to survive, but to develop and prosper. Because each individual community shares common resources and experiences the same weather pattern, a collective response to climate change is likely to be most effective. Collective responses require at least a degree of common understanding of the opportunities and challenges that the community is facing, and some collective organisation in order to agree upon actions and mobilise any necessary resources. Here we explore how joint processes of this nature can best be initiated.

It is perhaps arrogant or naïve to assume that there is a starting point to adaptation processes in affected communities, because successful adaptation is part of the inheritance of all surviving communities on the planet. Nevertheless, in our experience, reflection on the impacts of extreme events, or assessments of vulnerability of communities to climate impacts usually trigger the decision on the part of community groupings or responsible agencies to initiate an adaptation process. In the context of this book we are using the term initiating the adaptation process to describe the point where a decision is made by a group to consciously address a perceived climate-related vulnerability or opportunity. From the point of view of yourself as a practitioner, it is the point where you first engage with that group on the specific issue of climate change.

OWNERSHIP OF THE PROCESS FROM THE START

The success of any adaptation response depends in large part on the degree of ownership that the community group has in the process and its outcomes; and on the nature of your on-going relationship with them. The key objective of the initiation process is thus to build the foundation for community ownership, and for a good relationship. But who takes ownership and with whom do you build a relationship? Ideally you would want to be invited into a relationship by an existing community structure, such as a church committee, farmers association, producer co-operative, etc. The fact that a community group takes the initiative to invite you is already an important precedent of community ownership. In reality there are many different situations in which development practitioners and community groups meet each other, but the critical point is that community ownership should be established right from the beginning.

THE INITIAL FORMAL COMMUNITY MEETING

Let's assume that there has been some initial contact between you and a community group, and some discussion about the possibility of working together into the future. It's advisable to set up a first formal meeting which should cover the following:

- Explain clearly who you are (or who you represent) and what your interests are. What's in it for you? Why are you interested in working with this group? What do you want to achieve and why? It is not necessary that your interests (e.g. getting a PhD) are completely aligned with those of the community, as long as they are declared up-front, and do not represent a fundamental contradiction.
- Explain clearly what you can offer. How much of your time can you devote to the relationship and the intended process? How much money (and other resources) can you apply? Are there donors or supervisors who are not known to the community, but who expect to see a pre-determined "result" by a certain deadline? Be honest. The point is to avoid creating unrealistic expectations that, when they are subsequently not met, negatively affect the relationship. The greater the expectations, the more likely the negative effect will be catastrophic.
- Ascertain if there are any other protocols that should be observed, and ensure that you are not overstepping any lines of authority that might undermine the process, or cause problems for individuals who are involved in it.
- Find out if there are acceptable ways in which other people (outside the community group that has invited you) who may be interested in the process can be informed and even join in.
- Be aware that if you are introducing valued resources into a community that otherwise has limited access to them, you will be setting the stage for conflicts to arise over control of those resources. These resources could include tools and machinery, access to telephones, computers and the internet, paid work and transportation. Ensure that it is clear from the outset what values and procedures will govern the allocation of resources to members of the community, and how concepts such as "equity" will be translated into practice that most people accept as fair.
- You should try to get a clear understanding of the community group you are going to be working with. How are they structured? Who and how many people do they represent? Does the group reach decisions in transparent and accessible ways that allow all of its members to have ownership? You should also try to get a picture of the group's relationship with the broader community. An indication of difficult community dynamics is not necessarily cause for alarm, but it may influence the way subsequent engagements are planned.

- Unless you plan to live in the community for an extended period, it is likely that your face-to-face interactions will be interspersed by weeks or months of separation. It is important to establish a good communication protocol. How will you communicate? Who is the liaison person from both sides, and how will they inform others? What are the procedures for organising future workshops and meetings?
- Once you and the community group have a good understanding of each other, it is a good idea to develop and agree on a shared set of principles or values that will govern your future relationship. If appropriate to the context, this could take the form of a written document where each organisation (yours and the community group) formally agree to abide by certain agreed principles and procedures. Typically, this could include things like: “Treat each other with mutual respect” and “We will share relevant documents transparently” (see the section on Ethics and Values for other ideas). This can be treated as a “living document” to be added to in the future reflection in evaluative processes.
- And finally, after both parties have a clear idea of what can be done together and how it could be done – and the community group has “invited” you into a relationship, it is a good idea to capture the jointly-agreed key intentions of the process in writing, for later reference and guidance. As with the above, the form that this agreement takes depends on the context. It is not a “contract” in the legal sense, but rather a joint statement about the process you are about to launch, what you hope will be the outcome, how you intend to go about the work together and an expression of the commitment that each party will make.

2.2 UNDERSTANDING THE LOCAL CONTEXT

Initiating and supporting local adaptation initiatives requires sound understanding of the complex realities of climate-affected communities. However, outsiders are never fully familiar with the cultural, political, religious, economic or environmental contexts of these communities. Members of climate-affected communities will understand their situation in ways that are shaped by tradition, local hierarchies, ways of knowing and lack of information, and thus be limited in their ability to imagine an improved situation in the future.

Initiatives that are managed by people who are not adequately knowledgeable about the local context are less likely to succeed as a result of shortcomings of planning processes and unanticipated problems such as hijacking of initiatives by powerful interests and rejection or failure of technical solutions.
In order to minimise these possible negative outcomes:

- Inform yourself as well as possible about the local context in advance (research, conversations with informants, etc.) so that you are better prepared to integrate new information and knowledge.

- Be aware of your own values, prejudices and the ways in which past experiences have impacted on you so that you can better avoid the limitations that they impose on you. Beware of preconceived ideas about how things are and how they function, because they can mislead you and hide the truth from you.
- When you are facilitating or participating in discussions in the community, bring things to the surface in ways that they can be talked about and examined critically yet constructively, even if they are potentially conflictual.
- Encourage people to draw diagrams, pictures or maps to reflect how people, institutions, processes, things and places relate to one another; then facilitate discussion to enrich the visualisation and to verify the facts or perspectives that it presents.
- Motivate people to view things in the light of new facts and perspectives so as to release inspiring ideas.
- Create building blocks for future action by bringing together knowledge and resources so that the most appropriate elements are integrated into plans.

Many useful "rapid appraisal" tools are available if you want to quickly and easily build up some kind of quantified "picture" of local realities, and the PLA Handbook in the Resources section of this book will make these readily available to you. We would advise you to focus on developing a shared and validated common picture of the history and structure of the local community and the ways in which the local natural resources respond to weather events and utilisation. Optimally this should include the complexities of cause and effect in the inter-connected spheres of the social, the economic and the natural environment. Don't let your curiosity and desire for quantified data distract you from the goal: the most valuable information and insights will not be available as quantified data, but as insights that arise from narratives, verified by the sort of triangulation that can take place in interactive processes.

It will be important to elicit and "surface" local and indigenous knowledge about resources that are valued by local people, and to explore how these forms of knowledge link to or contradict other forms of knowledge such as scientific knowledge.

Local communities survive and thrive by using intellectual, cultural, natural and physical resources to earn a livelihood and to enrich their lives socially and culturally. Many of these resources will have been used by people since before recorded history, to support their processes of adapting to climatic extremes. Despite the fact that the communities that you engage with will probably all be marginalised or "disadvantaged" in some way, it is not advisable to launch a participatory process, which calls for participants to articulate

their needs. The list will probably be endless and even after prioritising, you and the group will probably be left feeling depressed and without having uncovered anything new. A much better approach is to facilitate a group conversation around available resources. A simple workshop technique would be, for example, to ask participants to map out all of the institutions they have a relationship with (e.g. the local school, the local authority, the church, produce markets, other community associations, etc.). Those with a strong relationship are drawn closer to the centre of the page, those with weak relationships are places at the edges. A discussion can then follow about which of these relationships can be described as "assets", and which are strategically worth building on. Similarly, one could for instance ask the group to map out the location of water or grazing resources and how these are used. A discussion can follow about which of these "assets" are vulnerable, and if so, what needs to be done to protect them. The resultant picture of the local context populated with "assets" (qualified with comments on what obstacles exist, or what needs to be done to use them more productively) is a much more enlightening and motivating picture than a long list of problems that need to be addressed.

As the facilitator, you will need to guide the discussion around resource mapping while allowing the participants freedom to determine what they think are useful resources. While natural and physical resources will probably be quite evident, don't neglect the less tangible "social assets" like networks, collective and individual skills, community heritage and identity, etc.

Another workshop technique that can help understand the local context is visualisation. A simple form of this process would be to ask participants to draw a picture or map of their community as they would like to see it, in say 20 years' time. It is advisable to form small homogeneous groups (e.g. women, youth, farmers, traders, etc.) for this task. The discussion that follows can be centred on the differences or similarities that each group presents. It is often surprising how different these future visions are, and for the participants it can be a valuable insight into the priorities of different parts of their community. This material is also a useful reference point for participants to revisit later on in the project's life.

Understanding the local context requires a flexible approach. Not only is the context constantly evolving, but your intervention will also be influencing and further changing it. Avoid comfortable assumptions, and try to keep as well informed as possible, especially as relates to changes that will impact on the processes and initiatives that you are involved in.

You may have opportunity to engage with community members on a social level. This can easily occur if you are spending time in the community and being hosted as a guest. You may also be invited to participate in important events such as funerals or festivals. You could consider engaging in these social activities to get a better understanding of people's lives and realities, and interrogate your assumptions about the community. By doing this, you can shift your relationship with the people from that of beneficiaries to fellow human beings.

Be aware that by participating in social interactions you will be associated in people's minds with those who you have shared this interaction with. This could mean that you are seen as a friend of powerful individuals, which will probably influence your ability to interact on an equal level with others. While there are no recipes here, use your own best judgement to assess what the likely implications are of such social engagement. If necessary, gently disentangle yourself from situations that are becoming fraught with negative associations.

2.3 COLLATING LOCAL AND SCIENTIFIC KNOWLEDGE

WHY DOES IT MATTER?

A coherent collation of local and scientific knowledge of the local area that you are planning to work is a bridging step between understanding the local context (see section 2.2.) and establishing priorities around which action plans can be developed (see section 2.4.). However much of what is described in this section is applicable throughout the term of your relationship with the local community group. What we mean is that throughout the project, new information may emerge that needs to be acknowledged; or new issues may be identified that need to be supported with scientific knowledge.

Participatory action learning is essentially a process of building new knowledge, which is generated and owned by the participants themselves. This new knowledge is the product of planning, exploration and reflection. But before moving in this direction, it is useful for the group to take stock of what they know about their own environment, and for you to introduce external knowledge that may shed new light. The aim is to ensure that planned actions are well grounded in terms of knowledge about the climate and its impact on

natural resources and livelihoods. Please note that we are not talking about using scientific data to develop a “benchmark” here. If you wish to do that (which may be appropriate in certain circumstances), you should consult the appropriate literature.

This section will outline some of the reasons why collating local and scientific knowledge is an important part of the overall process, it will describe some of the principle that you need to apply, and will also give some practical advice about how to go about it.

SHARING RELEVANT LOCAL KNOWLEDGE FOR ADAPTATION

As a practitioner, you are probably relatively familiar with accessing scientific knowledge. This is generally well documented and available, and you may already be networked into academic and scientific circles.

Local knowledge by contrast is usually built through lived experience and is seldom documented. It needs to be surfaced, reflected on, acknowledged and documented. There are various ways of doing this and your choice of process will depend on the specific context. Ideally it should be done as a participatory exercise rather than questionnaire-type research. For example you could facilitate a workshop which includes asking the participants in small groups, to describe the characteristics of each season as they experience them, and how each season impacts their livelihoods. With farmers, this would raise questions such as the best time to plant, the condition of local streams and rivers, the effect of heat stress on their crops or livestock, etc.

A further exercise could look in more detail at the negative and positive impacts of these factors on their livelihoods. For example, do summer heat waves have a significant impact on their production? Is the status of the local river important to them, and why? Taking this even further, you could get the group to discuss whether these characteristics have changed over time. Did the river flow more strongly in the past? Have farming practices changed? Depending on the responses, you may want to take the process a step further by getting the group to discuss why this is so. Slowly a picture will emerge of how the group makes meaning of their changing environment.

There are many good reasons why collating local knowledge should be done as a participatory exercise, and should be done at all. Local (or indigenous) knowledge, because it is based on lived experience is often anecdotal and “invisible”. Despite the fact that it may be the basis which guides many of the livelihood

strategies of the particular community, it seldom exists in a structured form where it can be debated or tested. It may not even be recognised as "knowledge" by the local community. By revealing and acknowledging it, the process helps to build a sense of self-worth in the group, and of ownership of the process and its outcomes. The sustainability of any outcomes of the project will be enhanced if the community group feels that they have made the decisions on what to do and how to do it, and have faith in their own powers of analysis. Forcing decision-making based on "external" knowledge provided by "experts", invariably leads to outcomes that are not fully owned, possibly inappropriate, and which will probably be abandoned as soon as the "expert" leaves.

TRIANGULATION AND VALIDATION OF KNOWLEDGE

We also accept that there are many different ways of seeing and understanding the world. By surfacing and recognising these different world-views, including views based on conventional scientific knowledge, and bringing them to bear on a particular problem or question, the group is able to "triangulate"[3] these different views, discard those that it does not trust, and build further on those that are verified by evidence and experience. As important as it is to acknowledge local knowledge, it is also important not to pose the two forms of knowledge – scientific and local – as opposing each other. Both need to be validated and assessed for their usefulness in building a more complete and trustworthy picture of the dynamics of the problems faced.

We also accept that despite the robustness of scientific knowledge, it may have limited use when applied to a specific local context. For example, one may be able to obtain weather data collected over many years and present this to your community group as a solid, scientifically verified picture of weather patterns in the region. However the actual patterns experienced by the community may be very different because of microclimate considerations or different perspectives of what weather variables are relevant to them (mean annual rainfall vs. seasonal distribution of precipitation).

By recognising local knowledge, integrating it with scientific knowledge, and helping to build local capacity for reflection and analysis, one can provide an isolated or marginalised community with access to a new

[3] In this context triangulation means viewing the data, information or situation from at least three different perspectives. If there is a reasonable amount of overlap between the different perspectives, the group will probably be willing to assume that they are relatively robust, and they can build upon them. On the other hand, if there is serious disagreement between the perspectives they will probably need to re-assess the situation and explore it in more depth before they can serve as the basis for developing further knowledge-based interventions.

"language" with which they can engage with the outside world. Integrating these different forms of knowledge can contribute to the development of user-relevant, downscaled climate change projections (see the Goedverwacht example below).

Goedverwacht village and downscaled climate models

Between 2012 and 2014 EMG facilitated a series of workshops with people of Goedverwacht, a small mission station in the Western Cape, South Africa. One of the objectives of the work was to understand whether downscaled climate and hydrological models would provide local people with information useful to their planning for the future and adapting to environmental changes. By using a variety of participatory workshop processes, we built up a rich picture of how the community understood their relationship to surrounding natural, social and financial resources, and how these had changed over time. Using this anecdotal evidence, together with data from nearby weather stations and from land-use maps, scientists at the University of KwaZulu-Natal were able to present a more "scientific" picture of the situation and share their predictions of how global climate changes might impact at this local catchment. At the final workshop, participants from Goedverwacht considered the pictures generated by both the scientists and their own reflections. They were able to point to deficiencies in the scientific picture (e.g. it did not take account of the local micro-climate), but also to acknowledge its recommendations (e.g. to clear the choked-up riverbed of thirsty alien vegetation) and integrate these recommendations into the community's future plans.

As a result, the community has embarked on a number of projects to rehabilitate their local stream, and a few selected community members are now regularly recording rainfall and temperatures in the village. They are also committed to using the above experience and collected information to continue building a more accurate picture of their climate change challenges and adaptation opt

Collating local and scientific knowledge needs to be guided by the questions posed by the community group. This gives the process some focus. These questions (or at least some idea of the groups' main concerns with respect to their vulnerability to environmental and other changes) should emerge from an assessment of the local context (see section 2.2.). As the facilitator, you may need to spend time with the group interrogating their "questions" in order to make them as relevant as possible to the "climate challenge" and to the types of community responses that are possible, given their various limitations. For example, there may be concerns

or questions emerging about the local stream or river as a current and future source of water for households and crops. This may lead to a focus on collating information on rainfall patterns, the impact of "thirsty" alien vegetation on the health of the catchment area, the impact of upstream users or polluters, laws or regulations governing water extraction, etc. Each of these can be further explored. How much time and effort you and the group put into collecting and collating information on all of these factors can be based on a collective decision on priorities and whether collating more detailed information is useful. For example, it may be obvious that an infestation of alien trees is choking the river catchment, but the community may not yet have the resources to combat the problem. There is thus little use at this stage to spend a lot of time and energy in deeper investigation into this problem. It is sufficient to acknowledge the problem and "shelve" it for attention at a later stage.

INFORMATION GAPS

There may be questions where the information available from both local and scientific sources is insufficient and does not provide a good basis for taking action. You and the group may decide to embark on some of your own research. This can be an incredibly empowering exercise, but also needs to be carefully planned and managed. Don't be too ambitious! Limit the scope of data collection and the timescale. Focus on data that can be easily collected and analysed, and where necessary, provide the group with the appropriate equipment and a thorough understanding of how to use it and how to record the data – and why the data collection needs to be done in a certain way.

If local researchers do not feel a deep sense of ownership for the process and its outcomes, the quality of the data might be compromised. After all, how much trouble could you expect a person to go to if they were asked to collect data only because someone else wanted it, especially if they would not be involved in analysing the data or reviewing the outcomes of the research? If the immediate requirement is to deliver a data set, and there is no long term relationship of respect and trust between the data collector and the data processor, the data collector might be tempted to make up data in order to complete the data set or fill in obvious gaps.

Remember that the process of capturing data is probably as important as the actual data itself. Design the research process in a way that gets the data collectors as involved and invested as possible, and allows them to own and manage the process – with your help and support where necessary. The decisions about what

data to collect, how often, who keeps the records, etc., should come from the group. Your role as facilitator is to guide and advise, provide a reality check, keep things simple, and ensure that their enthusiasm for building new knowledge (if they are not enthusiastic then you are doing something wrong!) does not run away with them. For example, if there is a need to collect rainfall data, distributing a few inexpensive plastic rain-gauges and a recording booklet may be more appropriate than a single, highly accurate, high-tech, automatic data-logger – despite the fact that the latter may give a better quality of data (although this is not always the case if it is not constantly maintained).

THE ROLE OF PARA-ECOLOGISTS

In participatory research projects, community members contribute to the project through their genuine interest in its outcome. It might be necessary to pay community members for the time they spend on certain tasks (in compensation for time they are not able to spend on their farming or other activities), but it should be clear to all that the payment is not the purpose of their involvement.

In the case of research and implementation projects that have been developed from a largely scientific perspective, but which nevertheless aim to interact with members of local communities, it might be appropriate to work with para-ecologists. A para-ecologist is a member of a local community who possesses local knowledge and is trained in one or more fields of ecological science so as to be able to be professionally involved in research, development or adaptation projects. Training is largely provided “on the job”. Well-selected and trained para-ecologists contribute effectively to scientific research and also to local capacity development. The para-ecologist also has an important role in terms of enhancing communication between local and scientific communities (for more information on para-ecologist programmes visit www.paraecologist.org). By being both a member of a rural community and of a professional research or practitioner team, the para-ecologist can bridge the gaps that typically exist between the local and scientific knowledge in terms of language, perception and fields of expertise.

Involving para-ecologists can be of great value for research projects, and is also of great potential value to the para-ecologist. However, it is essential that the work and the relationship should be well managed. In this regard it is very important that there be a clear definition of the role that the para-ecologist will play in the project and of the specific tasks that she or he will undertake. The nature of field research demands

that para-ecologists should be able to work self-reliantly and professionally, which again requires adequate training, regular backstopping and continuous mentoring by an experienced and motivated senior team member. Fulfilling this role requires a supervisor to be willing to engage into a close working relationship with the para-ecologist(s).

Working experiences in a professional team and the associated capacity development can enable para-ecologists to become key team members who are an asset for the practitioner or researcher, and for the local community. They can support the project and the community in various ways, such as helping to share information about climate change projections and their implications with farmers, sharing farmers' perceptions with practitioners or researchers, acting as a local contact person for the project, and facilitating the communication between practitioners and the community in general. Particularly in remote rural areas they can grow into important resource persons for the community. Their technical skills (e.g. use of GPS, cameras, computers etc.), problem solving skills and insights into the goals and approaches of science can be of great value for rural communities, particularly in developing countries.

2.4 PLANNING FOR ACTION

By this point in the bigger process, you should have built a good and trustful relationship with the community group. You should also have developed a coherent picture of the context, the challenges faced by the community and the resources that have available. No doubt some clear challenges have also emerged along with the group's enthusiasm to begin tackling them. This section outlines the process of turning the challenges and enthusiasm into action.

Don't rush into this step or try to push forwards because of your own needs. If you get a sense from the group (or key parts of it) of a sudden unwillingness to move forward, a sense of confusion, or tension, then it may be that you need to stop and take a few steps back. There may be community dynamics that you have not fully understood, or the group may still have unresolved questions or issues. It could be any number of things, but it's important that you try to get to the bottom of the problem and try to address it.

When you facilitate a planning process, ensure that the "right" people are participating. By this we mean not only those who want to be there because of their interest, enthusiasm and commitment, but also those whose authority and/or access to resources will be essential to the success of any plan. It's also often the case that not all members of the group participate in workshops and processes, even when these are well-planned and advertised. At any point in the process some people will still probably be playing catch-up. The nature of the plans will be determined by those present, and it's preferable that participants include group members who have been involved throughout, who have access to the resources needed, who have the authority and ability to take the planned actions; and are prepared to commit themselves to the plans.

CLARIFYING PRIORITIES

It will be worthwhile to convene a meeting where priorities can be clarified and plans can be developed in terms of the emerging priorities of the community. At the start of a planning meeting, provide the opportunity for all to clarify what their expectations are for the meeting, and what the intended purpose of the convenors is.

It may be that some clear priorities for action have already emerged in previous processes. If a clear vision has been articulated, and the resources that can be used have been identified, a prioritisation process will be needed. Ensure that the priorities for the different groups within the community have been identified (e.g. women, the youth, the elderly, pastoralists, crop farmers, etc.) by given people the opportunity to discuss their concerns within groups of their peers.

Techniques for establishing priorities for action are very much dependent on the context, size of group, degree of cohesion, etc. Your skills and sensitivities as a facilitator will be crucial. A possible process is to ask the members of each group to visualise their priorities (for example, by generating a series of cards, with one priority written on each card) and then ask the groups to share their priorities with the plenary. These can be ranked in some way. For example, group members can be asked to select their top three priorities (a more comprehensive picture will emerge than if each can only choose one). For other techniques refer to the PLA Handbook (Pretty, Guijt, Scoones, & Thompson, 1995).

However the group arrives at its priorities, it's critical that these are widely shared, and are not just the preferences of a small but dominant section of the community group. As the facilitator, it's your responsibility to ensure that the less dominant, less confident members of the group also get an opportunity to reflect on what they think is important.

Bear in mind that the planning process is an iterative one, and priorities may shift as peoples' knowledge and experience of what can be achieved evolves. Explain that, as plans are made and implemented, it may be necessary to revisit priorities in the light of emerging experience.

PLANNING TO ADDRESS THE PRIORITY ISSUES

Even when clear priority has been identified, it may not be articulated in the form that is suitable for developing a plan. For example, farmers in a semi-arid area may have identified access to water as a key priority. But this can't be turned into an action plan until it has been unpacked further into practical response strategies, like addressing excessive run-off of rain water, fixing the broken windmill, purchasing and installing rainwater tanks, etc. Each of these strategies can be addressed through a series of activities that should be written up in a plan. It may be that it is not the right moment to address some of the most pressing issues for reasons such as a lack of appropriate resources, insufficient knowledge of the situation, lack of political leverage, etc.

Help the group to be realistic about what can be done, and if this is in the context of a funded project, make it clear what kind of support your organisation will be able to provide. There may be some less critical, but easily tackled "low-hanging fruit" that when successfully addressed will also serve to inspire and motivate.

FROM PRIORITIES TO PLANS

In its essence, the planning process is simple. After having agreed on a set of issues that are suitable for addressing, let the group break each issue down into its actionable parts, describe the steps that need to be taken (how much detail will depend on the context), who from the group will take responsibility for making it happen, and by when does it need to be done. In some cases activity steps will need to be tackled in a definite fixed order, and this order should be noted. In short, the plan will be a list or table reflecting what will be done, how it will be done, by whom, the deadline date and the resources that will be needed. Here is an example of how this could be used:

WHAT?	HOW?	BY WHOM?	BY WHEN?	RESOURCES NEEDED
Collect $25 from each member to pay for inputs for agreed actions	House to house collection from all members	Adele	Monday 27 May 2015	Receipt book and ledger
Fix the windmill	Replace broken rod	Joe	Saturday 1 June 2015	2 metre wooden beam (4 cm X 4 cm)
Purchase 2,000 litre rainwater tank and 10 metres of guttering	Purchase from local building supply company	Adele	Monday 3 June 2015	$350 (from funds collected from members)
Install guttering and rainwater tank	Fix gutters to wall; tank freestanding on sand base	Mary, Pete, Liz & Joe	Monday 10 June 2015	Ladder, tools, wheelbarrow (borrowed from members), sand (from riverbed)

In many instances a simpler table will do as well: What?, Who? and When?

If you have got this far, it is in large part through the enthusiasm and will of the participants in the group. But implementing the plan will demand real commitment and investment in time and energy – and often this is given voluntarily. It's important that those who accept responsibility for implementing the plan do so voluntarily and willingly, and with full knowledge of what the job will entail.

Throughout the planning process, try to assess if there is a good balance between what people would like to do, what they are realistically capable of, and what resources might be available. Avoid over-ambitious plans. If it is clear that plans are likely not to be completed in the allocated time, either limit the plan to what is manageable within the timeframe, extend it, or break the process into phases so that community members can reflect after each phase and re-plan before tackling the next one. This will help avoid the frustration and sense of failure that can arise if the group is not able to meet its commitments.

Don't forget to include yourself in the plans. It may be the appropriate point to commit resources. And include "the next meeting" in the plan, where the group can check on progress. Get a clear agreement on who will be reporting back on progress.

REFLECT

At the conclusion of the planning process, ask participants to reflect on the process and visualise their contributions in written words or diagrams and pictures. The feedback from this session will provide insight into the level of commitment to the process, and will also enable those responsible for follow-up meetings to improve on the process. As in all reflective processes, first ask people to reflect on the positive aspects ("what went well?") before introducing the more critical aspects ("what did not go so well?") and asking for suggestions as to how future processes could be improved.

AND FINALLY……. KEEP A GOOD RECORD OF DECISIONS, AND USE IT WELL

The planning meeting is the point at which participants will have developed a legitimate expectation of tangible change. Not everyone will emerge from the meeting with the same expectations. Ensure that the decisions taken in the meeting are clearly recorded, verified by a few key individuals and shared with the participants. At the next meeting, share these minutes and provide people with opportunities to feed back in terms of their accuracy, and in terms of progress that has been achieved.

2.5 ACTION

FROM PLANS TO CHANGE

When there is a clear collective vision for improving the situation, coherent plans are in place and sufficient resources are available to make a start, the time is ripe for starting to address poverty- and climate-related challenges and improving the situation. However, bear in mind that the action-learning process advocated in this book is not a linear process. While “action” comes neatly and logically after “action planning” and before “reflection”, and this logic should be adhered to as far as possible, it is likely that some actions are being planned at the same time as others are being implemented. It may happen that the group stops and reflects on progress and re-adjusts their plans before the originally planned activities a have been fully completed. It may also be that one of the action-learning steps has been skipped altogether. All of this is normal and should not be cause for distress!

Unless you are living in the community you are working with, it is likely that actions that the community group agreed to take in the planning stage will be set in motion in your absence. Check that any endorsements or

authorisations for decisions that may be needed from people who were not present in the planning process have been obtained. People who feel excluded from their rightful role in the process will probably obstruct the process, and this can absorb a lot of time and effort to rectify after the fact.

WHOSE ACTION?

Implementation of Community-Based Adaptation process is the joint responsibility of all stakeholders who have a legitimate role in the process. However, primary ownership for the vision and the actions towards realising the vision should always be the community's, and the broader the base of ownership and support for the adaptation action, the more likely it is to achieve positive results.

For the development practitioner, there is a fine line to tread between facilitating and advising members of the community and their organisations, and playing a more pro-active role in implementing actions and correcting mistakes. In the earlier stages of the process a more interventionist approach may be needed, and may be welcomed by some or all members of the community. Keep in mind that even if it is appreciated, this can lead to unhealthy dependencies. The trend should be consistently towards strengthening local ownership and enhancing initiative on the part of the community, even if this results in outcomes that are not entirely what you, the facilitator, had in mind.

If the adaptation initiative is a government- or donor-funded project, the external facilitator will also need to ensure that the resources allocated and requested by the community group are delivered in a timeous manner. If the community group or organisation lacks a functioning and accountable structure, it may be best to provide resources in forms other than cash. Most vulnerable communities are severely resource constrained, and the introduction of new resources, especially in the form of cash, can lead to tensions, suspicion and conflict.

If possible, external facilitators and advisors should continue to engage and to be available as a sounding board and a source of advice and moral support throughout the adaptation process. Unlike all members of the local community, the external facilitator will probably be relatively free of the vulnerabilities, obligations and constraints that community member face on a daily basis. This makes it possible to be a neutral sounding board and even an arbitrator between different interest groups or individuals.

LEARNING WHILE DOING

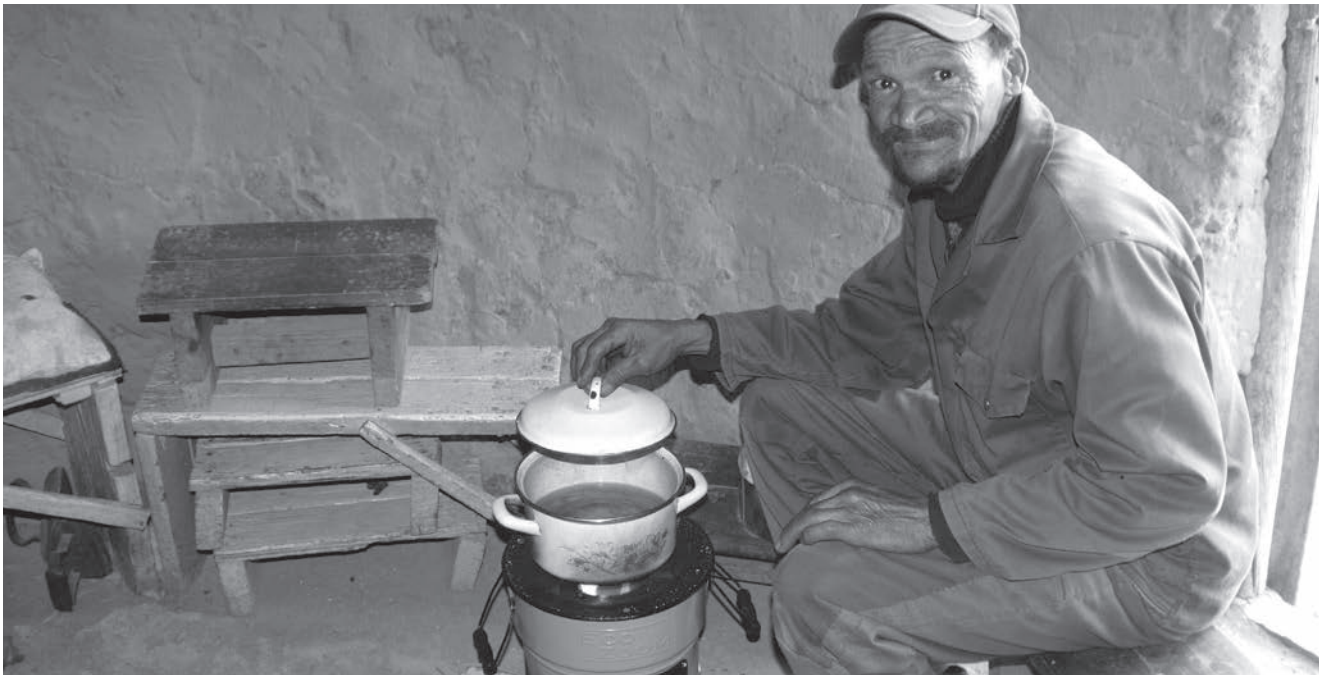
Experiential learning is an essential aspect of action research and CBA processes. As the action proceeds, create opportunities for people to reflect on their experience and the initial, visible benefits or shortcomings. Ensure that everyone understands and feels that their ideas and perspectives are valid, useful and important. Not only will this build ownership, but it will also enhance the value of the information shared. People who are usually marginalised because of their social status, age or gender have unique perspectives and knowledge. Bring it into the overall process. This will enable all to participate actively in improving practice and avoiding pitfalls that become apparent as the process unfolds, and will strengthen ownership. If the intended beneficiaries are able to shape and direct the process to ensure that their perceived needs are met in ways that are appropriate, the CBA process is more likely to achieve its goals.

It is quite acceptable and usually necessary for people to readjust their original action plans in mid-stream, as they observe what changes will improve implementation or achieve better or more far-reaching results. All too often it is only during implementation of plans that some of their flaws emerge. Without adjustment at this stage, sub-optimal results will be inevitable.

If major adjustments to the action plan are necessary, revisit it and facilitate a revision with the responsible group of decision makers and/or implementers. Make sure that others who need to know have been informed of any changes and that if their endorsement is important they have an opportunity to give this before the next actions are taken.

As far as possible, conceptualise monitoring, evaluation and impact assessing processes (see 2.8, below) in ways that are integrated into the implementation of process. It is certainly less useful to know what went wrong and why only after the process is completed and the resources have been used up.

2.6 REFLECTION



WHY REFLECTION?

Reflecting on what has been done and achieved creates opportunity to assess without judgement, and thus to learn without excessive stress and gain insight into how to improve future actions. When done collectively within a team, reflection will enable members to gain insight into one another's perspectives and perceptions, to develop deeper empathy and to mobilise energies and deepen commitment to achieve outstanding or additional objectives. Reflective moments are quiet spaces in which intuitive knowledge can emerge and combine with what people conclude in more logical ways, creating a richer picture of the dynamic processes of adaptation.

If reflection is not acknowledged by all as an important aspect of the action research cycle, it might not be prioritised and may lose its rightful place on the agenda to planning exercises, discussions or conflict resolution. When facilitating adaptation processes, ensure that time is allocated for reflection at appropriate intervals. It is particularly useful to reflect at the close of a workshop so as to give participants the opportunity

to recall and share which aspects of the process, content and interactions were of value, and why. Equally important are the less positive or even negative experiences of participants.

Adaptation is a complex process, and if we limit our focus to a small range of actions, we might well miss seeing other options and open the way for maladaptation to take place. Reflection will enable facilitators and participants to appreciate the progress that is being made (even if this means that negative social and environmental impacts have been contained to some extent), to learn from what has not gone as well as hoped, and open up the frame of engagement to include other participants.

THE ESSENTIALS OF REFLECTIVE PROCESSES

Reflective processes should be designed to enable participants to take stock (on a personal level, and in terms of collective endeavour), and bring all actors in the process on board so that the insights of all can be shared and harnessed.

In a sound reflective process space and opportunity will be created for people to think more laterally than they might otherwise have the opportunity to do.

The way in which you reflect, or facilitate the reflection of others, will determine the quality and the depth of the insights that emerge. There are no precise “recipes” for reflective processes. However, one useful approach is to first reflect separately on (i) the chronology of events (what happened and when), (ii) relationships and how/why they have changed, (iii) new insights that have emerged, and (iv) levels of energy and passion…. And then look at them together and record your reflections.

Whether you will be reflecting on your own, or with a group, seek out a quiet and safe space to reflect in, where the chances of disturbance are minimal.
If you will be reflecting on your own, you may want to refer to some pictures or written material that relate to the intended focus of the reflective session: have these available. It will probably be useful to have a pen and paper available to record your reflections: frequently, the act of writing helps to articulate thoughts that might otherwise stay just below the surface of your conscious mind. As you let your minds flow back over your experiences, try first to focus on the positive aspects: what you have achieved, what you have enjoyed and what you have found value in.

In reflective processes undertaken by groups, the facilitator will be inviting other participants to share their insights. Some of these insights might not be comfortable for others to hear, especially if they relate to their performance or behaviour. While it is important to ask people to phrase their feedback in a respectful way, it is even more important to encourage all participants to accept all feedback, even critical feedback, as a gift. Honest feedback will provide a unique insight into how others have experienced or perceived a situation or action, and can help members of the group to improve their interactions. For this reason group members should be encouraged not to defend themselves against what they might perceive as criticism, and not to try to justify their past actions, but rather to embrace the opportunity to learn.

Some essentials for reflective processes for groups include:

- Equip the space with a flip chart and pen (or equivalent) so that the reflections can be recorded and their meanings clarified.
- Ensure that everyone understands the importance of the reflective process, and is willing and able to devote the necessary time to it.
- Ask all participants to turn off their mobile phones and commit the time that is needed.
- Make sure that everyone feels safe to share their insights and concerns without fear of censure.
- Make sure that everyone understands their own responsibility to make sure that others feel safe and able to contribute freely.
- Ask participants to sit or stand in a circle, facing one another: this sort of non-hierarchical situation will make it easier for all to contribute, and lessen the likelihood that the more senior will dominate.
- Remind participants of what they had previously agreed to do together (for example, this could include reflecting on their team contract (see 1.5: Participation), the objectives for an exchange visit that they have just participated in, or their expectations for a workshop.
- First ask people to focus on the positive aspects of their experience (and assure participants who want to contribute something less positive that there will be an opportunity to do so later). You can ask people to share “what I liked” or “what went well in the process?”
- Go around the circle and politely but insistently ask each person to contribute an insight or thought. If someone has nothing to contribute, assure them that you will give them more time but come back to them later. Record the essence of what has been shared, and ensure that the speaker in question confirms that what has been recorded is in line with their actual thought or experience.

- Once all have contributed one insight, do a second round for willing contributors only (no pressure) so that individuals with more to contribute have the chance to do so.
- Now ask the questions “what did not go so well in the process?” and “what did you not like so much?” Some people might not have any negative experiences: tease the negative out gently, but do not force people.

Finally, in the light of what has been shared (both the positive and negative), ask participants to reflect on what they would like to do differently on a future occasion if they were attending a similar event (“What should we do differently next time?”)

2.7 SHARING LESSONS

BEST PRACTICES OR BEST SPIN?

Adaptation to climate variability and change is a highly complex and dynamic process in which people and institutions must constantly respond to unpredicted events and shifting frame conditions, and on-going learning is essential. Whether individual, collective or institutional, much of what is learned is likely to be of primary value in the specific context, and may not be directly transferrable to other situations. For these reasons we would suggest that describing and disseminating "best practices" that describe a process that can ostensibly be replicated elsewhere is less useful than sharing a more nuanced understanding of the factors and processes that contribute to effective adaptation.

In order to enable others to learn effectively and usefully from the successes, insights, challenges and failure of others the conventional tools such as reports, publications or presentations at conferences are not optimal, in part because they predispose the writer or presenter to presenting elements of the experience in

a way that shows a clear logical progression from planning through implementation to the achievement of the pre-identified goals, which is generally consistent with the expectations of donors, peers and supervisors.

Frankness and honesty regarding inadequate understanding of the context in which the adaptation process has been supported, inadequate or incorrect information, misconceptions, changes to plans, misappropriation of resources, maladaptation and downright failure require courage, and might well result in cessation of funding, withdrawal of other sorts of support, loss of face and status and even loss of livelihood. Under these circumstances anyone could be forgiven for putting a positive spin on the narrative and drawing conclusions that are based more on fiction than on a clear-sighted analysis of the experience.

LEARNING FROM FAILURE AND THE UNINTENDED

One of the richest sources of insight and knowledge is reflection upon the processes that may or may not have achieved their intended outcomes, but also resulted in unintended outcomes (both positive and negative). How then to draw on the rich lode of learning that lies hidden in the unplanned, the serendipitous and the failures, and to share this in ways that others can benefit from the insights by learning how to facilitate these processes more positively?

Within a professional environment that is frequently unforgiving, it is essential to create safe spaces for sharing and learning within which people will be more able to share openly. This is more easily achieved in face-to-face situations in which people can be invited to be candid without the fear of being recorded or quoted verbatim, and insights can be shared, discussed and compiled without direct attribution. Evaluative processes conducted in this way will produce more insightful material because they not only enable open sharing, but also create synergies between participants that help them to uncover patterns of causation that they might only have been partly aware of.

EFFECTIVE PROCESSES FOR SHARING

Whereas it is vitally important that policy makers and donors understand what sort of interventions are likely to succeed, and which will more likely result in maladaptations, it is equally important that members of affected communities should have opportunities to share and learn in their own context, and between one another. Effective tools for these peer learning processes include participatory video and knowledge exchanges, also known as cross-visits: see the Adaptation Toolkit in Section 4.

Participatory video enables participants in adaptation processes to record one another sharing their experiences and insights in a relaxed atmosphere in which they are more likely to be candid. Enabling them to subsequently participate in editing the material generates pride, builds ownership of the material, and provides opportunity to exclude any footage that might be seen to be damaging.

Knowledge exchanges (Oettlé, 2004; Oettle & Koelle, 2003) enable the facilitator to create different opportunities for sharing experience and insights, both formal and informal. Members of rural communities generally derive a great deal of pleasure and stimulus from meeting members of other communities that have similar skills and experiences, and face similar challenges. Facilitated knowledge sharing processes, interspersed with informal discussions whilst walking in the fields or eating together, provide excellent opportunities for frank exchanges of experiences, which in turn provide rich material for collective and individual learning about adaptation processes.

2.8 ASSESSING IMPACTS

Adaptation processes take place in complex settings, often involving many different stakeholders, organisations, sectors and agendas. While we often try to implement adaptation processes that will address a specific challenge, it is important to decide how to monitor the impact of these interventions before getting started with implementation. Planning the ways and methods you are using to assess impacts of certain adaptation interventions can also help us think through some of the intended and unintended impacts our actions might have.

CHALLENGES OF ASSESSING IMPACT OF ADAPTATION PROCESSES

While the actual methods used to monitor impact should be adjusted in the course of the adaptation process as needed, it is important to keep a few challenges in mind relating assessing impacts of specifically adaptation processes:

Complexity challenge: Complex systems make it often difficult to attribute a specific positive or negative impact to a certain action. It is thus important to understand the system within which the interventions are taking place and the possible impacts different interventions could have had on the system. It is helpful to engage various stakeholders in this process, including the intended beneficiaries.

Integrating different types of knowledge: in order to be able to understand complexity, it is important to understand and integrate different types of knowledge when trying to understand a complex situation or problem. Types of knowledge can include local knowledge, indigenous knowledge, scientific knowledge, knowledge about political and administrative processes, etc.

Shifting baselines: Most adaptation processes are operating in an environment within which the baselines are constantly shifting (e.g. there might be trends for higher extreme temperatures in summer, repeated droughts in the past decade, or an increase in the number of extreme weather events). This should be considered in assessing the impact of adaptation processes. Answering the question: "if the project interventions did not take place - what would the impact have been?" can help to unpack this issue.

UNDERSTANDING WHAT HAPPENED AND WHY

The process of monitoring and evaluating impact is essentially one of learning to improve the specific process or measures being implemented, whilst also striving to ensure that the learning from this particular process can support, inspire and enhance other adaptation processes.

Understanding complex situations can be challenging, but when assessing the actual impact of an adaptation intervention it is crucial to involve the actual beneficiaries (whether they are the intended beneficiaries or not) in the assessment process.

In a participatory adaptation process, stakeholders involved have often a clear idea of what they would consider positive and negative impact, and what it may be attributed to. The facilitation of an impact assessment learning process should be designed in such a way that it draws on these insights, whilst also:

- Creating a safe space for all persons participating in the reflection process.
- Ensuring all sides can be heard and that all voices are recorded (including more quiet groups!).

- Expressing appreciation for sharing insights and learning - positive or more challenging perceptions can be shared more easily when it is clear that they are really appreciated, and if there is a sense that this sharing of experiences (and that risk that this sometimes entails) is really informing practice, and may result in improvement!
- Ensuring that you have sound data about impacts. Facilitating an on-going process of monitoring by community members can be a good way of doing this. This data can then be presented in the course of the impact assessment, preferably by the community members who are directly involved in the monitoring.
- Interrogating the impacts and their attribution using all types of knowledge you have available. Sometimes using group discussions can be a good way to triangulate results.

WHY SHOULD IMPACT MONITORING BE PARTICIPATORY?

Participation in impact monitoring by local communities enables more accurate and truthful assessment of impacts, and deepens ownership of the process and its outcomes on the part of the local community. Key aspects to consider in this regard are:

- Understanding the impacts of different inventions on various groups is crucial (considering age, gender, ethnicity), including an understanding of different vulnerabilities and the impacts interventions might have on individuals in these groups.
- Effective communication is crucial in order to include a broad range of stakeholders and minority groups. This also means that effective listening is crucial!
- Ensuring that adaptation measures do not have a negative effect on some groups can best be achieved by exploring with members of these groups how they feel about the intended and possible unintended impacts of the project interventions.
- Impact monitoring is a learning process and should ideally stimulate new ideas for adaptation action that is fully owned by the intended actors and beneficiaries.
- Assessing the impact of adaptation processes (which often require considerable investment) will strengthen accountability and give a good indication of how funding and other resources can be used in a more efficient and effective in the future. If the perspectives and priorities of the local communities are reflected and addressed, their ownership of the adaptation processes will be strengthened.

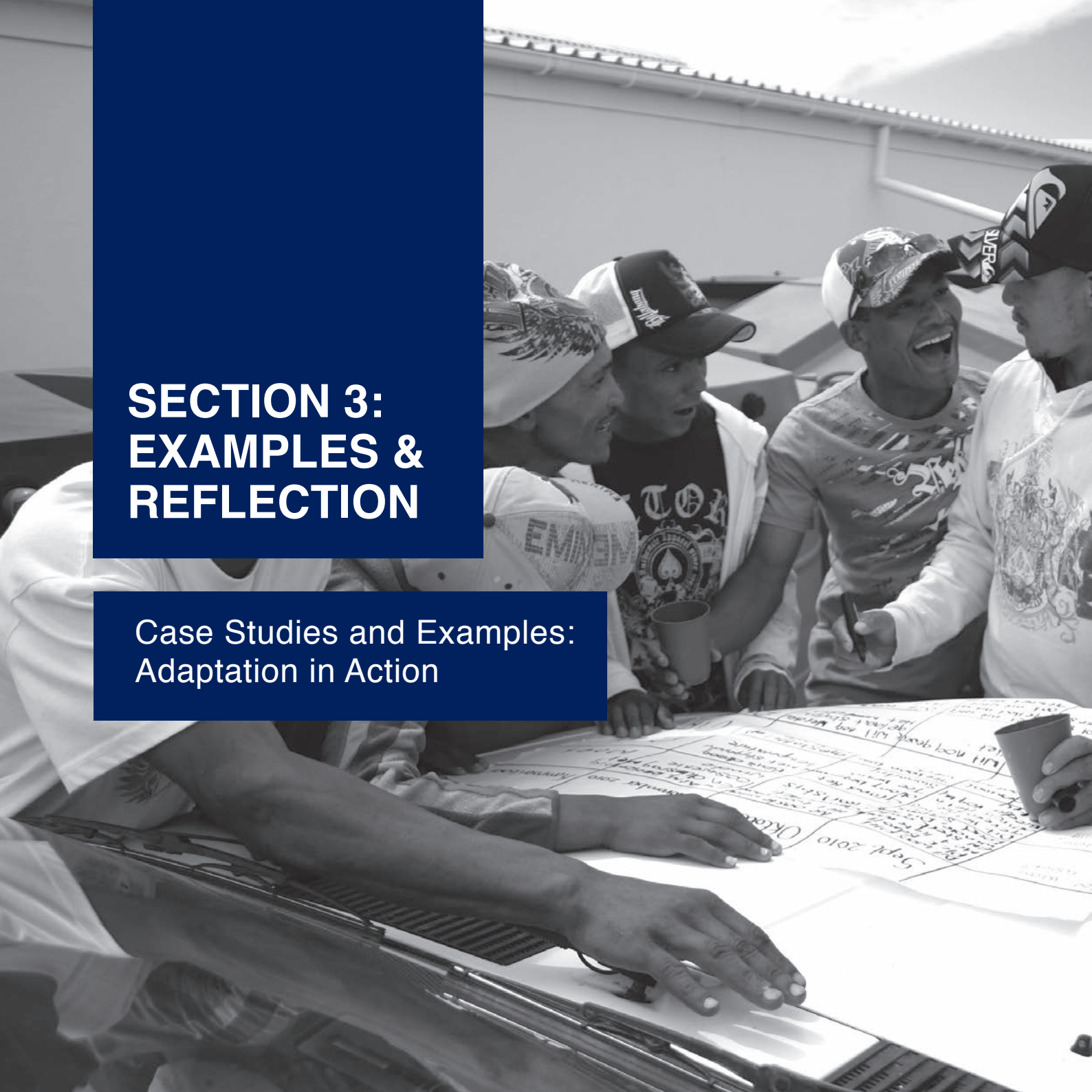
ACKNOWLEDGING FAILURE

As we have noted above, frequently the most precious, but least accessible learning available to practitioners that can potentially transform and enrich their practice is the learning from what did not go well. Pressures from donors and organisations to claim success and to promote “best practice examples” conspire to make learning from failure difficult to realise. However, unsuccessful adaptation processes provide rich opportunities for sharing lessons about what to anticipate and avoid. While best practice cases can be inspiring, their use for learning will be constrained if the limitations of the approaches in question are not communicated in an open manner. Promotion of “best practice” in ways that gloss over or omit to mention the shortcomings and pitfalls can mislead the audience and can thus result in flawed and unsuccessful approaches being repeated over and over again.

Successful adaptation processes are urgently needed, and ensuring that these are owned by local communities and are supported by an on-going active learning process is not a luxury but a necessity.

If you would like to explore ways of assessing impact of Community-Based Adaptation processes further, you can read the freely available PMERL manual published by Care and IIED (Ayers, Anderson, Pradhan, & Rossing, 2012)

This manual is available in electronic form at:
http://www.care.org/sites/default/files/documents/CC-2012-CARE_PMERL_Manual_2012.pdf



SECTION 3: EXAMPLES & REFLECTION

Case Studies and Examples: Adaptation in Action

3.1 ARSI NEGELLE, ETHIOPIA (Tsegaye Bekele)

Facilitating enhanced preparedness via quarterly climate change preparedness workshops

THE SETTING

The Arsi Negelle district is situated in the Rift Valley of Ethiopia, an area receiving annual rainfall of between 700 and 1 115 mm, with maximum and minimum temperatures of 18°C and 25°C, respectively (Asfaw, 1997). Mixed agriculture is the basis of livelihoods of the local people. They cultivate diverse crops, produce vegetables, and also engage in livestock production. Income from forest resources also makes an important contribution to local livelihood (Gudina, 2008).

The weather patterns in Arsi Negelle district are characterized by a dry season between October and January, and a small rainy season occurring during February to April and early May. The area generally receives most rain between June to August. The main rainy season is of crucial economic importance as agriculture, water

resources and hydropower industries entirely depend on the season's rains. Rainfall is highly variable during June and September.

The 8 farming communities who are the focus of this case study have a total population of approximately 427,000 people. The farmers represent the major agro-ecological zones of the district namely; Kolla (lowland), Woina dega (mid altitude), and Dega (highland). Farming incomes are based on the production of livestock and rain-fed crops. The capabilities and entitlements of households in the area vary depending on characteristics like gender and clan affiliation.

Households also rely on forest-based incomes in different ways. The area in which they live is surrounded by territory managed by Oromia Forest and Wildlife Enterprise (OFWE), Arsi branch, which produces forest products for the urban markets and supports the livelihoods of the local communities by providing construction materials, fuel wood for domestic use and sale, permanent employment for some and daily employment opportunities for the poor living in the vicinity of the forest.

Most of the farmers report significant experiences regarding climate variability and change. They have perceptions of an increase in temperature and a lengthening of drought periods. Their perception is that there has been a decrease in the quantity of precipitation and that the rainfall pattern has become less dependable, and is now more erratic, poorly distributed, and often of high intensity.

INITIATING A PROCESS TO ENHANCE CLIMATE PREPAREDNESS

Farmers in the district are highly vulnerable to climatic variability and change, being dependent on rain-fed agriculture and pastoralism. In response to the expressed concerns of the farmers, a team of academics from the Wondo Genet College of the University of Hawassa facilitated a series of climate change preparedness workshops between January 2011 and May 2014. The team comprised supervisors and students from the Mechal team, all of whom were engaged in a participatory action research process intended to foster an adaptive learning for farmers, district administrators, experts, development agents and academic researchers.

In preparation of each workshop, farmers and other stakeholders were informed by the district forest and natural resources experts and development agents. The place, date and time of each workshop was arranged and communicated to key officials in the district by the Mechal coordinator in Ethiopia and other

team members, who in turn informed the development agents, who ensured that farmers from all of the kebeles were invited.

The workshop venue was the assembly hall of Oromia Forest and Wildlife Enterprise (OFWE), Arsi Branch, which was made available at no charge for presentations, discussion and feedback. The workshops were typically held at key moments in the farmers' production calendar. Small-scale farmers of 8 Kebeles (peasant associations) participated in the workshops, along with the development agents from each of the Kebeles. Representatives of the eight farming communities participated in the workshops

In order to broaden buy-in for the process, and engage useful expertise, the facilitation team invited other relevant local stakeholders, including representatives of the District Administration and the Department of Agriculture, two experts from the Hawassa branch of the Ethiopian Meteorological Agency, and other relevant government experts and officials.

THE PROCESS

The first workshop of the series introduced the Mechal project to the community and other stakeholders, and explored farmers' perceptions regarding climate variability and change so as to understand what indicators of climate change they were aware of and what local coping mechanisms were being employed. The workshop also sought to share existing information and experiences, and to identify entry points for future interventions for successful implementation of the Mechal project.

A central input at each of the workshops was the presentation of the quarterly climate assessment report for the past season and the forecast for the coming season by an expert from the meteorological agency. This information was presented using PowerPoint to illustrate current and expected weather for the coming quarter.

At all successive workshops, the programme started with a summary of what had been presented and discussed in the previous workshop and with a feedback by the farmers on the experiences with the previous quarterly weather forecast.

In the course of the second and third workshops, it was possible to assess the level of understanding and trust that farmers in the Arsi Negelle district have of meteorology and the weather forecasts for their locality. Participants examined and discussed the deviations between their observations of the weather patterns in Arsi Negelle and the weather data forecast for the same area in the past season (i.e. small or main rainy seasons, spring and dry seasons). This exercise clearly expressed increasing confidence in the value of the forecasting data.

By the fourth workshop the farmers were able to share insights into how they had been utilising the weather forecasts and applying this knowledge in their day-to-day farming practices activities in the Arsi Negelle area. The forecast for the forthcoming main rainy season (June, July, August and September) and a report on the past small rainy season (February, March, April) were discussed and important lessons shared.

The three specific objectives of the fifth workshop were to discuss and get feedback on the outcomes of previous main rainy season forecast, to provide the quarterly weather forecast about the upcoming dry season (October to January), and explore various related issues with participants. The stakeholders also examined the interplay between household vulnerability, forest conservation and access.

Initially the workshops were attended only by men. However, with the encouragement of the facilitation team, women joined the later workshops. Women were thus able to gain direct access to the long range weather forecasts, and participate in comparing their experiences of the weather with local climate monitoring results.

Based on the typical variability measured at the four major weather stations in the study area, climatic information was downscaled for presentation during the quarterly climate change preparedness workshops. The workshops could thus serve as a platform for reporting and discussing past forecasts and comparing these with local climate monitoring results, so as to assess their relevance and accuracy.

FARMERS' PERCEPTIONS OF CLIMATE CHANGE AND VARIABILITY

The perception level and experiences of the farmers with regard to climate variability and change varied relative to the agro-ecology in which they farmed and also their socio-economic backgrounds. Despite the variation, however, all participating farmers perceived increasing variability and change in the climate of the district.

Participants shared their experiences and perceptions of the impacts of prolonged drought on human, livestock, woodland, soil, wildlife resources and described how their livelihoods were at risk. They were particularly concerned with challenges relating to the impacts of floods and soil erosion caused by heavy rains falling after a long dry period, which results in the destruction of field crops and products. Delayed rain and sporadic rain showers after a long dry period result in limited infiltration of water, and thus excessive run-off.

WHO IS MORE VULNERABLE?

The workshop process assisted district officials in the identification of the vulnerable social groups and ecosystem resources, which is important for designing effective and efficient interventions by the district authorities. To that end, farmers were asked to identify the vulnerable ecological zones and social groups in the area. They identified the lowland (Kolla) kebeles as being more vulnerable to climate variability and change mainly because the areas are already generally water stressed. The lowland kebeles are also constrained by limited options for alternative livelihoods, exacerbating the problem and limiting their adaptive capacity. On the other hand, in some cases the highlands are more affected than the lowlands, especially during intense rainy seasons. In such cases, crops in the lowlands benefit more and perform better as compared to their highland counterparts.

In Arsi Negele district, livestock (especially cattle) are particularly vulnerable to climatic variability due to shortages of water and feed. Among the community groups, elders, women and children are the most vulnerable to existing and future climate variability and change.

ACCESS TO AGRO-METEOROLOGICAL AND MARKET INFORMATION

Much of agro-meteorological and market information is shared in the traditional way, which has been long-established in the area. The farmers described it as ‘our father’s way’ of information transfer. Farmers from highland kebeles share information with their lowland counterparts and vice versa. In most cases, the highland and lowland kebeles are tied by marriage alliances and social relationships. In addition, some of the farmers confirmed that they also use modern media, mainly radio, to access relevant information.

The workshop participants, as representatives of the kebeles, were important 'multipliers', sharing their knowledge with the broader group of farmers. The involvement of the various stakeholders in this process was seen as an important step in the strategy of the University, in terms of which the climate change preparedness workshops will be continued in future by the district authorities, who will involve the local people in weather forecast discussions after the phase-out of the Mechal project.

Sharing of the seasonal weather forecast with small-scale farmers enabled them to make more informed decisions regarding the next season's sowing, planting, crop harvesting, storage and marketing. The farmers who participated in the workshops were asked how they incorporate the information that had been shared into their activities. They responded that they generally use it to plan field work such as weeding, harvesting and threshing the cereal crops. It was also valued regarding field preparation (i.e. timing of preparation of fields and selection of agricultural inputs), selection of crop variety (early vs. late), and sowing date and decisions on the timing of storage of crops.

REFLECTIONS ON THE WORKSHOP PROCESS

Discussion and knowledge sharing among all workshop participants enabled them to share views, concerns and suggestions for further improvements. The information and knowledge gained from the workshops was shared and disseminated amongst fellow-farmers who were not able to participate in the workshops.

Although most of the remarks were translated by an interpreter from Amharic (national language) into Afan Oromo (the regional language), some technical terms such as "La Niña phase of ENSO prevails globally" or "El Niño", may have limited the full understanding of the messages by some of the participants. Building on the experience of each workshop, translations were improved to enhance understanding of issues by all participants.

The number of workshop participants was restricted due to space and resource constraints, which limited participation. Delays in getting quarterly forecasts by the National Meteorological Agency of Ethiopia caused some delays in accessing the most up-to-date forecasts for some of the workshops, but it was nevertheless possible to provide sufficient information about the anticipated weather for the key seasons.

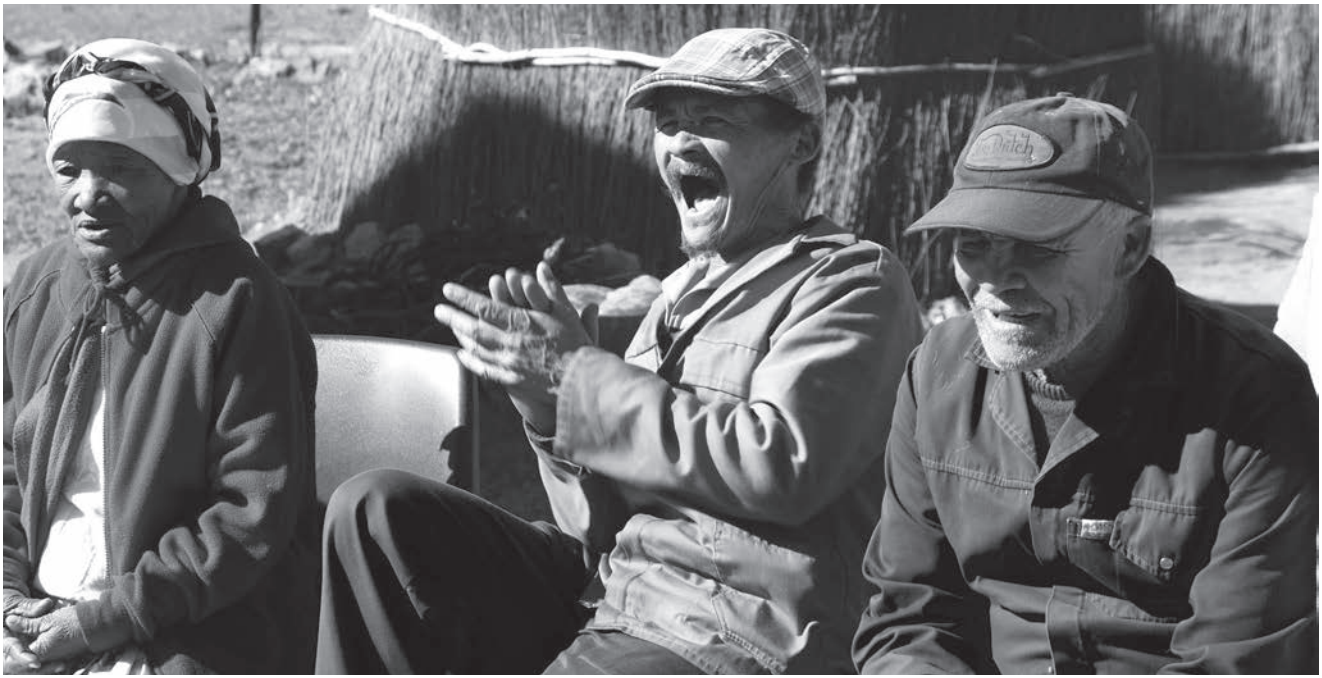
LESSONS LEARNT

Within the context of the PAR approach of the Mechal project, the quarterly workshops provided a vital point of interaction between farmers and the University-based research team. PAR is generally a more time consuming approach than a purely extractive data gathering approach. Team members had to be patient, respectful and be friendly with farmers at all times, even when meeting them by accident in an unintended way. It was important to inform farmers well ahead of time when and where such activities are to be carried out, so that they could plan to take the time out from their regular tasks.

Working closely with the main stakeholders in the Arsi Negelle district created a platform for sharing weather- and climate-related information with farmers beyond the life-span of the Mechal project in Ethiopia. Farmers have thus gained a valuable source of weather and climate information that they will be able to use into the future.

3.2 SUID BOKKEVELD, SOUTH AFRICA

(Noel Oettle and Bettina Koelle)



The story of a transformative adaptation and learning process in South Africa

THE SETTING

The Suid Bokkeveld (Northern Cape Province, South Africa) is a landscape of arid sandstone plateaus incised by deep ravines situated in the arid west of South Africa. It receives an average of between 150 and 300 mm of rain per annum, mostly in the winter. The acidic soils are well suited to the cultivation of rooibos tea (Aspalathus linearis), which is a drought-resistant indigenous crop that is uniquely adapted to the low fertility of the soils and the long summer droughts.

In the dryer parts of the Suid Bokkeveld a dispersed community of small-scale farmers produces rooibos tea and raises sheep and goats. Unlike their white neighbours, whose extensive commercial farms receive higher rainfall and which include adequate reserves to ride out droughts, the farming enterprises of these small-scale farmers are highly vulnerable to climatic extremes. This community has been shaped by a

long history of dispossession, discrimination and marginalization at the hands of the colonial and Apartheid regimes. When members of the community came together in 1999 to initiate a development process, they aimed to address the poverties that they had been enduring for generations and to transform their community to a more equitable one.

CHANGES IN WEATHER AND CLIMATE

Climate projections for this part of South Africa indicate a possible later onset of the rainy season, earlier cessation and an overall reduction in the winter rains upon which the local ecology is primarily dependent. MacKellar et al (2007) predict the pole-ward retreat of rain-bearing mid-latitude cyclones (with reasonable agreement across the models) by the late twenty-first century. In particular, this retreat of mid-latitude cyclones and reduction in rainfall is most consistently projected for early winter, with indications of reduced rainfall later in the winter season. Together, these projected changes suggest a shift in the timing of seasonal rainfall, with late summer rainfall heavier than present and extending to later months, and reduced winter rainfall arriving later (Archer, Oettlé, Louw, & Tadross, 2008).

ENGAGING WITH CLIMATE VARIABILITY AND ADAPTATION

The failure of the winter rains in 2003 (which was followed by three years of drought) placed severe strain on livelihoods and threatened the very existence of the community. This led to the initiation of a joint learning process between the farmers' own organisation, the Heiveld Co-operative Limited, two local NGOs (the Environmental Monitoring Group and Indigo development & change) and the University of Cape Town to enhance the capacities of the farmers to adapt to climatic variability and change.

At the time no initiative existed in South Africa to support small-scale farmers to adapt to climatic variability and change, and the project therefore set out to pilot community-driven adaptation and mainstreaming approaches, and increase local capacity in dealing with drought and desertification. In order to assess the relative resilience to climate change of cultivated and wild rooibos, a comparative study of the two sub-species was also undertaken. The project was endorsed by the members of the community, who saw it as consistent with the achievement of their own vision (articulated earlier in the course of a community workshop), and subsequently funded by WWF South Africa.

STARTING THE EXPLORATION PROCESS: THE CLIMATE CHANGE PREPAREDNESS WORKSHOPS

EMG and Indigo initiated a series of quarterly climate change preparedness workshops designed to enable community members to share their experiences and records of the weather and reflect on its impacts and their responses, and also to provide and discuss the implications of the latest long-term weather forecasts, focusing on the coming three months. In addition the workshops were intended to create a platform for learning and discussion of issues of common interest and facilitate the planning of individual and collective interventions that might assist people to adapt to the current or anticipated climatic impacts. These workshops were hosted in collaboration with the Heiveld Co-operative.

Since 2004, the collaborating organisations have hosted climate change preparedness workshops every three months. A number of donors have supported this work, including the Volkswagen Foundation via the Mechal Project, implemented in collaboration with the University of Hamburg. The workshops were conceptualized and designed as a safe space in which participants would be able to meet multiple human needs (Max-Neef, 1991) in the course of a multi-faceted, participatory learning process.

Over time, the workshops evolved into a valued platform where community members could share insights, generate new ideas, and plan collective actions on a regular basis. The workshops came to encompass and address far more than adaptation, creating space for reflection and providing an important point of focus for a collective development process. They also provided a platform for the development and accountability of multiple small projects in the community addressing aspects such as alternative energy provision, water resource monitoring, soil erosion control, livestock monitoring and propagation of wild rooibos. These projects were facilitated by the two NGOs using a Participatory Action Research approach (Koelle & Oettle, 2009; Koelle, 2013; Louw, 2006; Malgas et al, 2007).

The workshops also came to serve as the point of sharing and accountability for processes such as knowledge exchanges to other communities, and for sharing knowledge about topics that were not related to adaptation or livelihoods. Over time participants gained more confidence and were able to surface diverse problems, and to address these through peer learning and other forms of knowledge sharing. Farmers started collecting weather data and reporting more accurately on weather impacts and patterns (Koelle & Waagsaether, 2014).

SUSTAINABLE DEVELOPMENT IN THE SUID BOKKEVELD

In parallel with the facilitation of the adaptation processes by the NGOs via the workshops and associated field activities, the Heiveld Co-operative gradually expanded its role in contributing to the sustainable development of its members. The Co-operative responded to the drought by providing its members with rooibos plant material to replace the drought fatalities. By doing so each planting season while the drought endured, the Co-operative was able to ensure that its members were able to continue producing and earning incomes and the Co-operative itself could retain its place in the market. With the appointment of two Mentor Farmers to advise its members regarding sustainable production the Heiveld was able to promote knowledge sharing and solution-seeking amongst its members.

USING NEW OPPORTUNITIES: HEIVELD WILD ROOIBOS

At an early stage of project implementation it emerged from the associated research that the sub-species of rooibos endemic to the area which had traditionally been harvested in the wild, but not cultivated, were far more resilient in the face of drought conditions. As opposed to production in cultivated fields, which inevitably lead to loss of soil carbon, husbanding wild rooibos retains soil carbon and biomass of indigenous shrub cover. Traditionally, this so-called “wild rooibos” had been mixed with the cultivated tea. The Heiveld created a market for wild rooibos tea, enabling consumers to exercise their preference for this “biodiversity-friendly and climate friendly” rooibos product, and enabling producers to benefit directly from sustainable harvesting practices and the associated conservation of the environment in which the plant occurs. The Heiveld has consistently paid the highest price in the industry for sustainably harvested wild rooibos tea.

GENDER AND ADAPTATION: STRENGTHENING LEARNING PROCESSES

Founded in 2001, the Co-operative has steadily grown in terms of its capital base and impact within the community. This impact has been a result of paying its members the highest price in the industry for their rooibos tea, ensuring that its members pay employees at a rate higher than the legal requirement or the local norm, and investing in the social development of the community. In 2004 the Heiveld secured organic and Fairtrade certification and started exporting its products directly to trading partners in South Africa and abroad. Over the years its membership broadened and included more women. From an initial 14% of membership, by 2012 women

accounted for 40% of membership (Oettle, 2012). Two of the five members of the Board of Directors are women, as are all three permanent members of staff of the organisation. Participants in one of the quarterly workshops, reflecting on what strategies might make a farm more resilient in the face of climate change, floods and natural disasters, commented "We have progressed a long way because women are also involved in many activities and much is still possible".

ADAPTATION AND LIVELIHOODS: FAIRTRADE AND ORGANIC CERTIFICATION

The Heiveld has established an international reputation as a producer of sustainably and fairly produced rooibos tea, and in 2014 it won the United Nations Equator Prize, receiving international acclaim for its local actions with global impact. The Co-operative has demonstrated the importance of effective local institutions by consistently playing a role in supporting its members to adapt their farming practices to greater experienced and anticipated climatic variability, and its partnership with NGOs and links both to the scientific community and members of the international community have played a significant part in enhancing its ability to do so. An important part of the role of these partnerships has been that they have provided what Herriger (2006) describes as resources for self-determination and independence, which have supported people's efforts to organize and direct their own lives (Herriger, 2006), thus contributing to their individual and collective empowerment.

The interwoven processes of development and adaptation in the Suid Bokkeveld have been characterised by a steady expansion of the options and actions available to members of the community to sustain their lives and enterprises. The empowering nature associated with these processes have encouraged people to discover their own strengths and to enhance self-determination and autonomy (Herriger, 2006).

The adaptation process in the Suid Bokkeveld can thus be understood as what Nelson et al. (2007) describe as "a process of deliberate change in anticipation of, or in reaction to, external stimuli and stress". Following the initial shock and reactive response to loss of production during the drought of 2003 – 06, the responses of the community have increasingly been anticipatory, i.e. they have taken place before the impacts caused by the stressor (Tschakert & Dietrich, 2010).

3.3 BERGRIVER CLIMATE KNOWLEDGE NETWORK

(Penny Price, Emma Archer van Garderen, Mark New)

Creating an enabling environment for adaptation, transition and transformation at the local level

THE SETTING

The Bergrivier Municipality is situated within the West Coast District of the Western Cape Province of South Africa, covering an area of 4407 km^2, including the settlements of Redelinghuys, Eendekuil, Aurora, Velddrif, Porterville, Piketberg, Dwarskersbos, Laaiplek, Goedverwacht and Wittewater. Comprising both coastal and higher altitude settlements, it includes so-called niche settlements and regional service centres (such as Porterville), as well as predominantly rural areas.

In response to experienced and anticipated climatic change, in 2012 a collaborative initiative between the Municipality and the Municipal Support Programme of the Western Cape Government's Climate Change Sub-Directorate initiated the development of an adaptation plan for the area.

The Bergrivier Municipality Climate Adaptation Plan was drawn up in a participatory manner with local stakeholders, and key vulnerabilities and stressors for the area were identified as part of the process. Six key stressors were identified:

- Poor infrastructure and limited services
- High dependency on grants
- Poor water quality (river water)
- Limited employment opportunities
- Migration and seasonal work

(Bergrivier Municipality Climate Adaptation Plan 2014).

It is interesting to note that the 2014 Integrated Development Plan (Bergrivier Municipality 2014) review indicates that primary industries for the area (agriculture, fisheries and forestry, as well as mining and quarrying) are characterized by a declining trend, while the West Coast District Municipality statistics indicate severe effects of the global recession. These broad trends have significant implications for a number of the key stressors indicated above.

Finally, the Adaptation Strategy indicates key climate impacts for activities in the area serviced by the municipality, including significant projected impacts on low income housing and storm water (in particular, flooding events); projected impacts of high temperatures on natural resources in the form of veld (rangeland), soil and land; projected impacts of erratic rainfall on the wheat sector; and, finally, projected impacts of heavy winds on the fishing industry (Berg River Adaptation Strategy 2014).

CLIMATE PREDICTIONS FOR THE AREA

The municipal area has already been experiencing changes in key climate indicators. For example, Lötter's analysis, cited in the Adaptation Strategy, indicates significant trends in increased frequency of heat wave days, including the fact that the top ten warmest years for all stations analysed were found to occur after 1997 (Lötter 2012, Berg River Adaptation Strategy 2014). Changes in rainfall intensity were also evident; while seasonal analysis of rainfall for the area indicated a trend of decreased rainfall for the majority of stations for the winter (June-July-August) period; as well as an upward trend for autumn (Lötter 2012).

Projections for the area include a robust prediction of continued higher temperatures in the future; as well as an increased likelihood of higher frequencies of high rainfall intensity events (Davis, Engelbrecht, Tadross, Wolski, & Archer van Garderen, in press).

INITIATING A CHANGE PROCESS

Although this initiative started off as a government project aimed at supporting local municipalities in the province in the development of climate response plans, what unfolded was a series of opportunities for collaboration that once realised, grew into a platform of actors supporting climate response at the local level, in this case, known as the Bergrivier Climate Knowledge Network.

The first opportunity for collaboration presented was via a partnership between two climate adaptation specialists - one from the University of Cape Town (UCT), and the other from the Council for Scientific and Industrial Research (CSIR) - who had secured a small amount of funding to run municipal climate adaptation capacity building and planning in the West Coast District area. Their funding restricted them to essentially running one workshop in one municipality. They approached the Western Cape Government on hearing of the Province's intention to support municipalities in climate adaptation planning in the hope that an opportunity for collaboration would allow for an extended scope of support to municipalities, as well as avoiding any potential duplication of effort.

DEVELOPING A COLLABORATIVE APPROACH

Due to their combined vast experience working in local level adaptation and in particular in the geographical area concerned, this collaboration was welcomed by the WCG and it was agreed to combine projects through the intended climate adaptation work with Bergrivier Municipality, thereby extending the expertise in the team. In a parallel process, the WCG and UCT's Climate Systems Analysis Group (CSAG) had been discussing the inclusion of climate scientists in the Municipal Support Programme team, as a way to support municipal climate information needs, in an effort to bridge the science/policy /decision maker divide. It was decided that two climate scientists would join the team working with the Bergrivier Municipality. This meant that the Bergrivier Municipal Climate Adaptation team now comprised of two provincial officials, two climate adaptation specialists, and two climate scientists. The adaptation planning process started through a series of engagements and workshops with a multi-stakeholder group comprised of municipal officials, councillors and external stakeholders.

While this climate adaptation planning process was under way, the WCG team was approached regarding further possible collaboration, this time by UCT's African Climate and Development Initiative (ACDI) that had been tasked with developing transdisciplinary research around climate and development. Sensing openness to this kind of engagement, Bergrivier Municipality was approached to gauge interest in this additional collaborative offer. Based on the positive nature of the experience with the existing collaboration, this suggested expansion was positively received and became known as the Bergrivier Climate Knowledge Network (BRCKN). This group consisted of the existing municipal climate adaptation planning team, senior academics representing a wide range of disciplines at the University of Cape Town, municipal officials, local residents, farmers, NGO staff and private sector representatives, as well as officials from CapeNature and the provincial government. In an effort to build trust and cohesiveness across such a diverse group, a year-long facilitated process was designed based on the basis of Otto Scharmer's Theory U process (Scharmer, 2009). This demanded significant commitment from participants, but the rewards were great for those who participated. Participants learnt about 'walking in each other's shoes', conducted learning journeys in the municipal area, and engaged across disciplines and sectors.

This was a rich learning process which resulted in the formation of a cohesive group focused on transdisciplinary research in support of the Bergrivier Climate Adaptation Plan which had been drafted early on in the process. The success of this initiative attracted the attention of others doing similar work in the area, one of these being the Environmental Monitoring Group (EMG), which has conducted climate adaptation planning with residents of one of the small ex-mission station settlements in the municipality, namely Goedverwacht. A further collaboration was created with this group, thus deepening the community-based adaptation element of the BRCKN.

OUTCOMES OF THE PROCESS

The outcome, at the time of writing in January 2015, is that there is broad-based engagement from stakeholders in the area, and the research taking place in the municipal area is feeding into the climate response decision-making capacity of the municipality and related stakeholders. There is increasing contact between researchers, local decision makers, residents and other important stakeholder groups in the area bringing with it a healthy exchange of expertise, experience and local knowledge.

Projects are emerging with independent funding that are aimed at increasing climate resilience and transformation in the local area. Essentially there is a self-sustaining network that is continuing to grow and gain momentum around supporting local climate response.

The Knowledge Network encompasses an engaged, motivated and collectively empowered group of people in key positions in government, civil society and research institutions who are able to ensure that the Adaptation Plan will be implemented and adapted in an inclusive, responsive, flexible and innovative manner.

This is an excellent example of a growing dynamic enabling environment of the sort that is needed to attain the kinds of transformation necessary to keep abreast of and respond positively to the rapid changes in the world we share.

The network has been the seeding ground for the emergence of a wide number of activities that could never have been foreseen at the outset, ranging from short students projects that looked at climate resilient low cost housing, to learning journey on development and water issues on behalf of the Tanzanian WWF, to a project developing complementary currencies for sustainable development among disadvantaged communities in Piketberg.

The relatively long process of co-exploration was essential in building trust and understanding between researchers and practitioners. This then enabled the group to navigate its way through various tensions that emerged between the more academic and action/outcome oriented agendas in the group: researchers understood better the constraints, motivations and drivers of practitioners and vice versa.

Four particular challenges for the network, on which such an endeavour likely fails or succeeds relate to coordination, facilitation, time and funding. First, all participants have full-time jobs and so a network coordinator was essential for ensuring continuity in communications, activities and events. Second, to maintain momentum, careful design and facilitation of network events and activities was needed – participants needed exciting, stimulating activities to keep the creative and productive juices flowing, incentivising them to keep network engagement at the top of their list of priorities. Third, both academics and practitioners have to juggle engagement in the network with their day jobs; for some academics with heavy duties and unsympathetic line managers, this was difficult; what worked for most practitioners was to get agreement from their line managers that involvement in the network should be included in the job description. Finally, running the network requires financial resources – the network was lucky to be supported by ACDI internal funds, for the first 18 months, but finding new financial resources for nuts of bolts of running the network has been difficult – funders often do not seem interested in supporting activities like the BRCKN from which so much innovation emerges, but prefer to focus on specific projects with clearly defined outcomes and outputs.

SECTION 4: TOOLS

4.1 EXAMPLE TOOLS

Facilitating Community-Based Adaptation is a complex process, and the facilitator will need to be able to access a large range of methods and tools to serve the process effectively. In this section we offer a selection of these that can be applied.

4.1.1 EXCHANGE VISITS

When initiating a process of Community-Based Adaptation, it might be important to provide community members with wider exposure to experiences of others who face similar challenges. Not only might this lead to people feeling encouraged by knowing that others face similar problems, but it can introduce new ideas and useful technologies, generate enthusiasm and stimulate collective actions. Community knowledge exchange visit are a useful approach (see also Adaptation Toolkit A2).

Checklist for Exchange Visits

This checklist is a guide for arranging the logistics for an exchange visit. Please note that this is not comprehensive and that inevitably some additional issues will probably have to be addressed.

Drawing up a budget and arranging finances

- Prepare a budget on the basis of available resources to guide expenditure during the trip and to help anticipate necessary payments
- Ensure that an emergency fund has been arranged to cover unexpected expenses (medical, vehicle, etc.)
- Ensure that a system for recording expenses and keeping track if the cash balance is in place

Travel arrangements

- Prepare an indemnity form that makes it clear to all that the travellers are undertaking the journey at their own risk, and for their own benefit.
- Ensure that reliable, suitable and safe transport is arranged well ahead of time (and check with the service provider at regular intervals to ensure that arrangements are still in place as agreed).
- Plan the trip so that regular “comfort” stops are included where the necessary facilities are available (drinking water, toilets, etc.)
- Plan to stop at sites that will be of interest to the travellers (historical sites, interesting landscape features, etc.).
- Make necessary arrangements for food and drinks along the way.

Useful equipment

- Route maps
- Pens and notebooks for participants
- Flip chart stand and paper
- Marker pens, paper and masking tape
- Camera, batteries and memory cards
- Mobile telephone, phone chargers, phone card, small change for pay phones, list of important phone numbers
- First aid kid

Ensure that participants are informed well ahead of the journey as regards:

- The agreed purpose and objective of the exchange visit
- Travel arrangements and the programme
- Risks and indemnity
- Special requirements (e.g. bring bedding, food etc.)
- How family members can contact participants in cases of emergency
- Special roles participants will have to fulfil during the exchange visit
- Any specific documentation (such as passports) they might require on the journey

Arrangements with the hosts

- Ensure that the host community/ies are aware of the purpose of the visit, and are in a position to host the group in ways that will enable them to learn in a safe and comfortable environment
- Once the detailed planning has been done, inform the host community about the programme and ensure that they have received it in good time (and adjust it in response to feedback from them, if necessary).
- Arrange for meals and overnight facilities with the local hosts or other service providers (and for the special needs of participants)
- Arrange for venue/s that suit the designed process for the community knowledge exchange

Roles of facilitation team members and dealing with emergencies

- Ensure that responsibilities have been clearly assigned to competent individuals (driving, facilitating, special events, stopovers etc.)
- Make sure that it is clear how the team is going to stay in touch during the exchange visit
- Prepare for any possible emergency (procedures, equipment, etc.)
- Ensure that a suitable first aid kit is available for the journey, identify team members that have first aid training and competencies
- Identify any special medical needs, and ensure the team can cope with them (if not, the person with these needs should not be included in the group)
- For longer journeys, assess whether medical insurance is necessary and appropriate, and make arrangements if necessary

If you would like more help to think through the logistical issues, see:

Capitalising on local knowledge: Community knowledge exchange. A toolkit for the preparation, implementation and evaluation of community-to-community knowledge exchanges, by Noel Oettle and Bettina Koelle. Published by the World Bank. IK-info@worldbank.org

"Community Contact", a guide on conducting exchange visits and study tours published by the Desert Research Foundation of Namibia, ISBN 99916-43-52-4

4.1.2 CLIMATE DIARIES

Once members of a community have decided to engage in adaption to climate change, they will probably be interested in building up a more complete picture of the climate that they live in. By providing interested individuals with climate diaries, maximum/ minimum thermometers and rain gauges, you can support them to increase their knowledge of the actual weather events that they experience, and enable them to contribute to building up a more accurate and nuanced picture of the weather in their specific locality. While total rainfall and maximum and minimum temperature are particularly important in an agricultural context, community members may find other "climate indicators" such as humidity and hours of sunshine useful and important.

We live in times of climatic uncertainty, and people experience the weather as increasingly unpredictable. Extreme events such as droughts and floods seem to be more frequent and more extreme than in the past. However, when it comes to verifying the facts about local weather events, many people have only their memories and folklore to rely on.

The climate diary is a tool that allows people to be in charge of their own weather data. By monitoring and recording weather data themselves they can build up a record which will enable them to compare their data with one another, reflect on past events and build up a more nuanced understanding of how weather events impact on their livelihoods. Climate diaries should be supplied along with a rain gauge and maximum/minimum thermometer, so that persons interested can document the data and use the measuring equipment on their own.

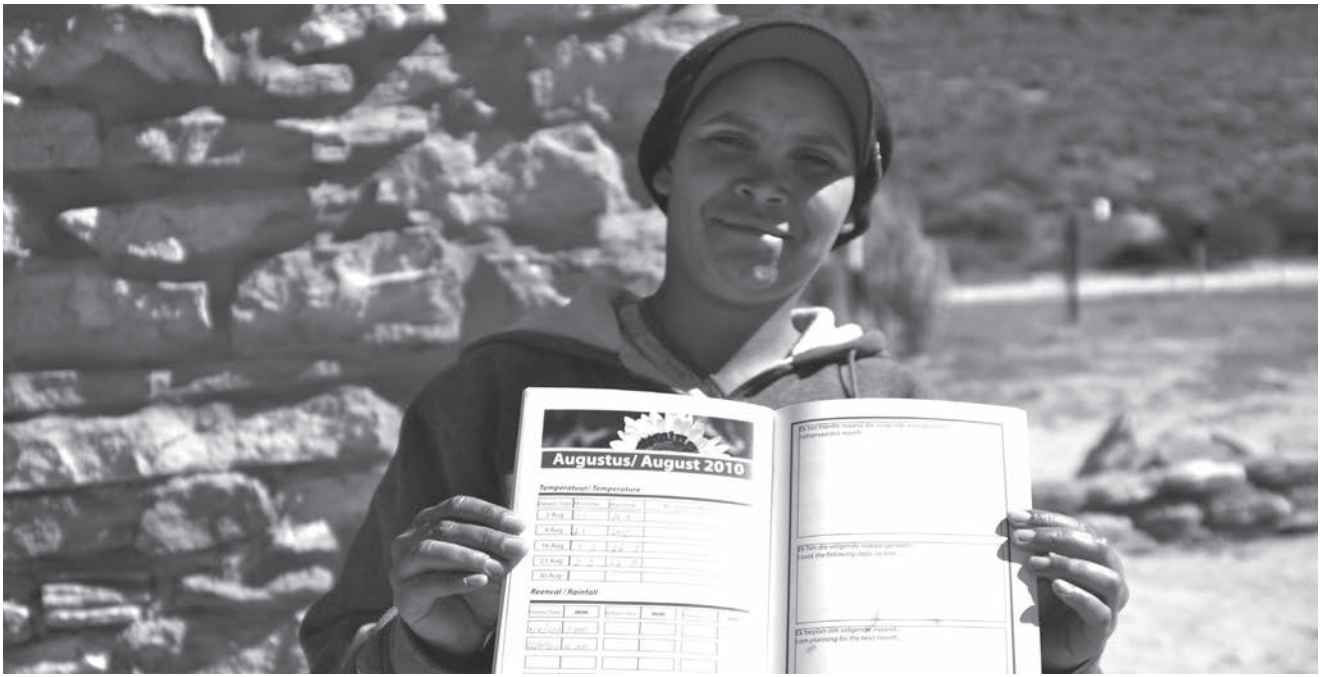
Climate diaries have been used for the past five years by people in the Suid Bokkeveld area to monitor the micro-climates of their farms. Maximum and minimum temperatures of each week are recorded, along with the daily rainfall data. Within the climate diaries monitors are also able to enter other observations about the weather.

This tool is not only useful in terms allowing people to gain more insight into the weather, but also gives people confidence when it comes to having general discussions around the weather with visiting scientists and other specialists.

In the Suid Bokkeveld (South Africa) climate diaries have been an important component in the on-going process of assessing impacts, reviewing long-term forecasts and planning for the future within a three monthly cycle focused on quarterly climate change preparedness workshops (see also Adaptation Toolkit A1). The climate diary has shown itself as an effective tool to enable farmers to compare the seasonal weather forecasts with experienced local weather, and to draw from this comparison insights into the relative utility of forecasts and planning in the light of expected climatic extremes. In most scenarios over the past five years the experienced weather has been similar to that anticipated by the seasonal weather forecast.

In the Suid Bokkeveld climate diaries have shown their worth in assisting farmers to plan their farming activities, and in planning other daily duties. The diaries, and the record that they contain, is also a source of

pride to many of the diarists, who take their responsibility as community knowledge generators and holders very seriously.



When using the climate diaries and toolkit (rain gauge and thermometer) it is important to check the following:

In the climate diary:

- Are people clear about how to record information in the diary?
- Are people aware of the creative possibilities of recording data that they want?
- Do people understand that the diary can be used as the source of data when sharing weather impacts in the course of workshops?
- Do recipients of diaries have suitable pens to enter data with? (it's a good idea to provide a pen with the diary)

The rain gauge:

- First and foremost, it is important to ensure that the rain gauge is erected in a suitable place (at least twice the distance from any the height of vertical object in the vicinity)
- Check that there are no holes in the rain gauge
- Is the gauge clean? Bird droppings in the gauge can make it difficult to read and can block the small holes in the top part of the gauge
- Does the user understand clearly how to use the rain gauge?

The thermometer:

- Ensure that the thermometer is erected in a suitable place, out of direct sunlight and protected from the rain
- Make sure that the battery/ies are fully charged
- Check to see that the thermometer is fully functional
- Make sure that the monitor receives a thorough explanation as to how the thermometer works, and supply the monitor with a manual with clear instructions
- Ensure that monitor is familiar with the operation of the thermometer (explain the functions clearly to the monitors, and then encourage them to operate the maximum and minimum functions and to clear old data under changing conditions so that they involved can learn this experientially within a supportive and participatory process)
- If a mercury thermometer is used, make sure that the monitor is aware of the environmental and human hazard caused by a broken thermometer.

It is important that the facilitators of such processes ensure that the data recorded in the climate diary is photographed at least every three months so that a central record can be compiled of all the data that is being collected by different individuals. This will provide a long-term overview of the weather trends, and additional insights in local micro-climates. Facilitators should keep in touch with monitors about how they are doing and whether they need any assistance with the monitoring. Facilitators should also make sure that monitors are aware that they are more than welcome to get in contact with the facilitators when they need the facilitators' support.

Changes at a landscape level tend to be gradual, and sometimes take place at a pace that people cannot remember exactly what the landscape and its features looked like in the past. However, being able to

compare the present with the past can provide valuable insights regarding the impacts of climate, land management practices, etc. In this regards fixed point photography provides a valuable and accessible tool.

4.1.3 FIXED POINT PHOTOGRAPHY

Fixed point photography is a very effective tool for monitoring change in vegetation and climate. Pictures are easy for everyone to understand! They tell a more accessible story than a complex scientific paper. Any person can interpret the information that pictures tell. Pictures can be used to compare impacts of different treatments, changes in vegetation over time or to record erosion and deposition. When initially undertaking fixed point photography, it is important that there is a permanent landmark/ mark at the site where the photography will happen. This could be in the form of a large boulder, a hill or a gully. Markers like boundary and camp fences, gates, well-established trees and windmills are also useful. In some cases it is useful to place a marker in the landscape (such as an iron post), but as markers of this nature could be removed by other people who might not know the reason for the mark they should be used with caution. It is useful to take GPS coordinates of marks in case they become lost or concealed over time, but it is important not to rely on GPS coordinates as the primary tool for locating sites.

When all this is done, decide on dates and times when the photography will take place. Depending on the purpose of the fixed point photography, this could be on a regular annual, monthly, or weekly basis, or it could be in response to some other stimulus like a significant rainfall event or the advent of a season. Because of the impact of shadows, it is useful to plan to photograph sites at the same time of day each time, and under similar weather conditions (sunny or cloudy) if possible.

We recommend either of the following two ways of taking fixed point photographs:

1. Photographing the site from a pre-determined point, such as a marker, with the same view framed in the lens as on previous occasions.

2. By photographing the plot or the site in panorama, where the marker is in the centre of the site. Place the camera tripod immediately above the marker and take a continuous series of picture from left to right (alternatively the pictures could be taken of the view from standard compass points (N, NE, E, SE, S, SW, W, NW)

Before leaving for the field make sure that you are leaving with this:

- Print-outs of photographs taken of the sites on previous occasions
- site location descriptions (and GPS coordinates, if available)
- a digital camera with charged spare battery and the correct lens (35 mm is recommended, but most important is that it is the same lens as used for the previous photographs)
- A note book with the numbers and descriptions of all the site numbers that you will be visiting and space to write down the number and other details of each photograph.

It is important that pictures are downloaded as one gets back to base to ensure that pictures are not deleted from the camera before they have been saved. Create and maintain a dedicated folder on your computer, and put the images onto CD or external hard drive for back up as well. Keep an annotated file of printed pictures that you can refer to and copy even if electronic data is lost or destroyed.

Images can be compared visually to assess what changes have taken place, and theorise about why, or they can be analysed digitally to measure, for example, changes in numbers of shrubs and trees, or the ground cover provided by vegetation. When interpreting the photographs, keep in mind that vegetation, particularly the ephemeral plants, will probably vary between seasons and even years depending on the respective rainfall. This might make the vegetation to appear greener or denser. The variance between seasons and years should be distinguished from changes due to continuous trends (e.g. decrease in shrub / tree cover).

4.1.4 PARTICIPATORY WATER MONITORING

Most rural communities are highly dependent on local water supplies from streams, springs and boreholes. Changing climate and land use can have a significant effect on the amount and quality of water available from these sources. Participatory water monitoring enables people to deepen their knowledge about these vital natural resources

In areas prone to water shortages in dry seasons or during droughts, active monitoring of water resources can alert resource users to pending water supply problems. Participatory water monitoring is an effective tool for engaging farmers and other members of rural communities in jointly monitoring their water resources, and if necessary planning emergency measures should the available resources reach critical levels.

The tool enables water users to document ground water levels and water quality, thus establishing bench marks against which future conditions can be compared.

How can a water monitoring process be facilitated?

It is important to ensure that resource-users (farmers and other members of the community) want to be part of the process. Farmers are the experts on their farms, so it is vital that monitoring process is facilitated in ways that ensures that they are at the centre of the process, and are comfortable to share their information.

Arrange ahead of time when and where a water monitoring process will take place. Be sensitive to the rhythms and the needs of the participants, so that the monitoring process takes place at a time that is optimal for them but also appropriate for the water source to be monitored.

On arrival it is important to make sure that all of the people who may potentially interested in the process are aware of it and feel invited to participate if they can.

Step 1

- Introduce the participants to each other; explain the objectives for the day
- Present the programme that you have prepared (and amend it if necessary in response to feedback).

Step 2

- At the initial workshop, Invite the participants to draw a map of their farm, and ask them to include important features or locations that will that they want to have on the map. In subsequent years, review the map and update where necessary.

Note: It is important that the farmers/ participants draw their own map: if outsiders impose their version of a map local people will not own it, might not understand it, and will probably not include all key information on it. Ensure that the participants have marked and named all of the water sources on the map.

Step 3

Note: The tools that are needed at this step are a GPS, data sheets and a video camera.

- Walk to all of the different water sources that have been marked on the map that participants have created. Conduct a video interview at every water source and ask the interviewee/s to explain what the water source is used for, e.g. “this water source is used exclusively for drinking water for people”
- It is also important to ask people to talk about the history of the water source, as this will provide insight into changes in the use, the reliability and the quality for the water source (for example, whether it has always been used only for human consumption, for livestock, or for both). If the use has changed over time, ask the interviewee to explain why this is so.
- If you have the necessary equipment you can measure and record water quality indicators such as conductivity (to establish salinity), ph and TDS (Total Dissolved Solids).

When doing the video interviews it is important to capture the following:

i. The name of the interviewee
ii. The history of the water source
iii. The location of the water source and the surrounding area
iv. The visual quality of the water
v. Play back the video interview so that the interviewee is satisfied with what has been said.

Step 4

- Hold a reflective session at the end of the water monitoring process with farmers/ participants.
- Take a photograph of the map and ask participants if they want to keep the original map that they have drawn (if not, keep it for the record, and for future interactions).
- Discuss the findings of the day with the participants, and clarify what the next steps in the process will be (if any).
- Say your farewells and leave the farm.

Step 5

Within the facilitation team:

- At the first quiet opportunity, reflect together about your experiences and impressions, and discuss and agree on what you will undertake going forward.

Step 6

- File the original data sheets in a safe place.
- If you have made use of Participatory Video (see also Adaptation toolkit B10), edit the video and distribute copies to participants who were involved in the process.
- Make sure that the movie is stored in a safe place: it will provide an invaluable point of reference in the future to enable people to reflect on whether things have changed in the interim, in what ways, and why.

4.2 OVERVIEW OF FACILITATION CARDS: ADAPTATION TOOLKIT

In this toolkit we present a selection of overall processes and specific tools and methods that can be applied by the practitioner. Please note that it is up to the practitioner to meaningfully combine overall processes and tools for best learning and adaptation action.

The series of tools is presented on cards accompanying this Handbook:
'A' cards: Overall adaptation-related processes
'B' cards: Interactive learning exercises
'C' cards: Climate related exploration/ monitoring

A	OVERARCHING PROCESSES	
A1	Climate Change Preparedness Workshops	A regular forum for community members participating in an on-going adaptation process, which includes elements such as compiling and sharing quarterly climate calendars, presenting seasonal weather forecasts, reporting back on community monitoring processes, sharing monitoring data, planning for adaptation action, etc.
A2	Knowledge exchange visits	Facilitating a peer-to-peer learning processes focused on a specific topic or set of questions to support creative thinking about possible adaptation solutions.
A3	Participatory Environmental Monitoring	Monitoring medium- to long-term changes in the environment can identify trends and support appropriate adaptation action.
A4	Participatory Action Research Processes	Participatory Action Research processes allow participants (for example community members and scientists) to explore a joint question bringing their knowledge and expertise to the process, within the context of a long-term process of learning and improvement.
A5	Participatory vulnerability assessment	A process supporting vulnerable groups to themselves assess their actual and potential vulnerabilities and thus inform adaptation planning and action.

B	INTERACTIVE LEARNING EXERCISES	
B1	Gender Walk	This short energizing exercise explores how gender differences and access to resources can influence vulnerability to climate change and the possibilities available to different individuals to take action.
B2	Farming Juggle	A short and playful activity to experientially learn how community members often have to juggle many responsibilities and how climate change related stressors can add pressure to people who are already dealing with multiple livelihood-related stressors.
B3	Seasonal Forecast Game	A game that allows participants to explore the interpretation of seasonal forecasts and gain insight into their personal risk taking preferences, and the likely impact of these preferences.
B4	Thinking on your feet	A quick and safe energizer to get to know the group and to shed light on specific skills, preferences, experiences etc. within the group.
B5	Reflection in small groups	Reflection is crucial for sound learning processes. Here are some simple ways to make reflections in small groups safe and effective.
B6	Individual reflection	Individual reflection exercises that can be undertaken while taking a silent walk in the environment in order to think about a complex adaptation question.
B7	Focus group discussions	Exploring a specific topic or question within a small group of stakeholders, experts, etc.
B8	Sharing seasonal forecasts	Some tips and tricks for effectively sharing seasonal forecasts with community members and other stakeholders.
B9	Climate calendars	Compiling a collective overview of the experienced weather during the past 3 months and what impact it had on activities (agricultural or otherwise) that provides a record and can facilitate discussion on possible adaptation options.
B10	Participatory Video	Participants plan and film their own videos to share experiences, make statements, lobby, etc. A process that can be widely used for diverse applications but needs access to video camera and editing equipment.

B11	Participatory GIS	Often adaptation challenges have a spatial dimension. Participatory GIS allows community members to record key aspects of the physical spaces that they live and work in, and to reflect spatial challenges. Requires access to mapping software.
B12	Qualitative interviews	Narrative interviews can deepen our understanding of complex realities of stakeholders and are an excellent way to gain insights, strengthen relationships and even engender enthusiasm.
B13	Visioning exercise	Adaptation processes need to be guided by a positive and shared vision that people are able to embrace and commit to move towards. This exercise enables all members of the community to participate.
B14	Fixed point photography	Understanding environmental or land use change by using photographs repeated over a long time frame.
B15	Using weather stations	Weather stations are a useful tool for understanding climate trends and local micro-climates if the data is managed well and the weather stations are maintained in good working order.
B16	Action planning	A quick exercise to help action planning in smaller or larger teams.
B17	Visualising action planning	Action planning process that creates a visually stimulating record.
B18	Monitoring of progress	Description of effective ways of monitoring project progress
B19	Timelines	Timelines often help groups to understand cause and effect within longer time sequences, and build a stronger sense of community and shared history
B20	Budgeting	How to manage a budget in the light of uncertainty and complexity of adaptation projects
B21	Activity planning	Planning activities using a chart can be a helpful way to co-ordinate activities and adjust when necessary.

C	TOOLS: ENVIRONMENTAL MONITORING PROCESSES	
C1	Monitoring your environment	Environmental Monitoring Processes can be crucial to better understand long-term trends and short- and medium-term weather extremes to inform appropriate adaptation action.
C2	Participatory water monitoring	Participatory water monitoring is a process developed by a group of farmers in the Suid Bokkeveld that includes monitoring of all water sources on farm every 5 years to establish trends.
C3	Participatory livestock monitoring	Understanding the impact climate extremes (such as extreme heat or extreme cold) can have on livestock is important in planning adaptation action for these activities.
C4	Phenological monitoring	Monitoring the impact of climate on affected plants and ecosystems provides important information for planning adaptation interventions.
C5	Temperature monitoring	Monitoring of temperatures by farmers with a simple maximum/ minimum temperature thermometer can improve understanding of extreme climate and its consequences.
C6	Climate diaries	Climate diaries allow farmers to record actual observed weather, temperature and rainfall and how this impacted their farming enterprises and livelihoods.
C7	Soil sampling	Soil sampling and analysis provide a good understanding of soil properties (such as nutrients, salinity, water retention potential, etc.) and how these may be impacted upon by proposed adaptation measures.
C8	Monitoring soil erosion	Extreme weather might result in increased soil erosion. Monitoring soil erosion effectively can provide insight into what strategies will result in sustainable land management.

SECTION 5: CONCLUSION

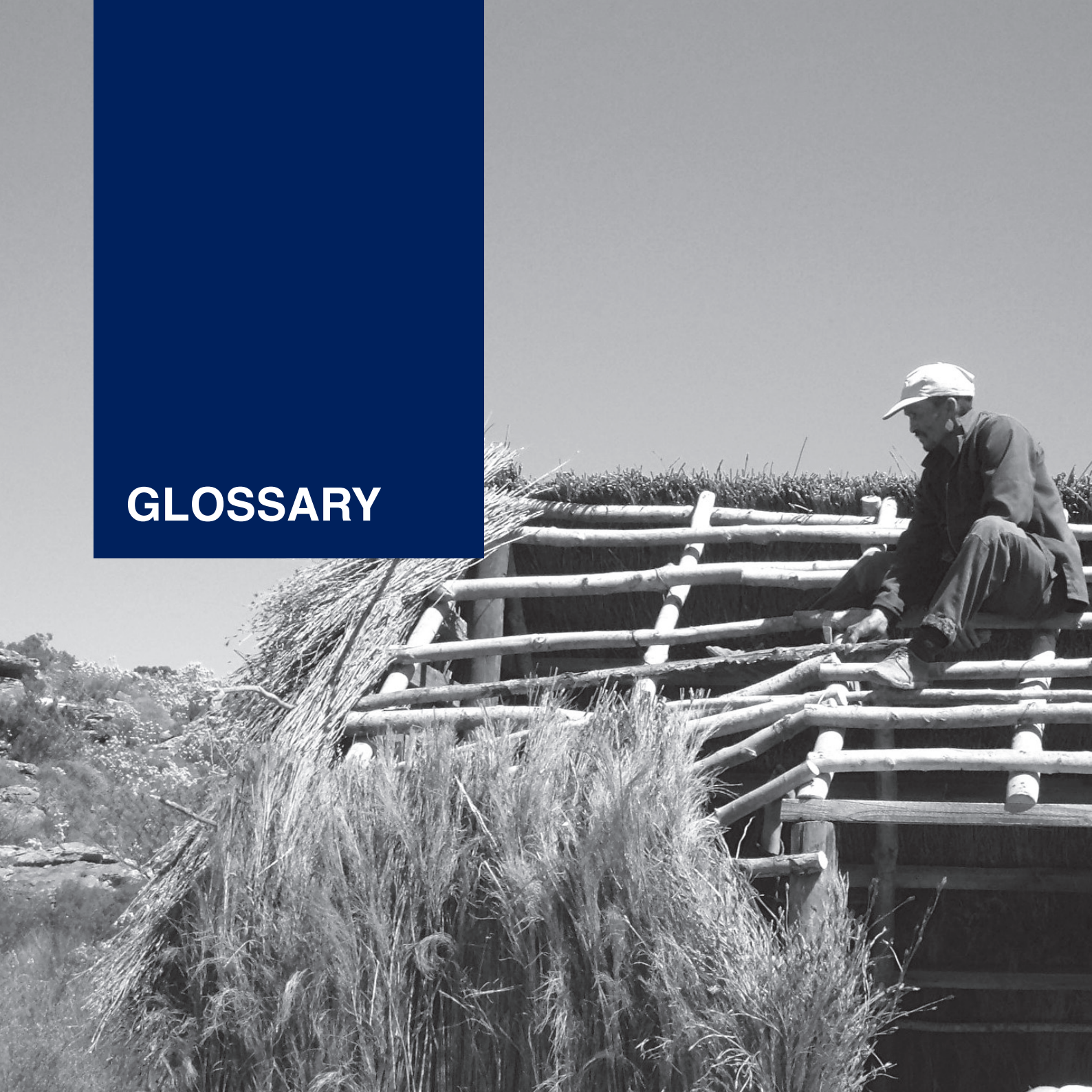
Humankind has evolved in a world of constantly varying climate. Storms, floods and droughts have come and gone throughout human history, and our pre-history reflects the impacts of ice ages and global warming on the lifestyles of our ancestors, who adapted and survived. This is our legacy as people.

Anthropogenic climate change has vastly accelerated the rate at which the climate is changing, at a time when virtually all other aspects of human life are deeply influenced by technological, economic, political, religious and lifestyle change. Adapting successfully to these changes is an essential element of sustainable modern living. And the ability of communities to adapt in ways that support one another and sustain the ecosystems on which they depend holds the key to people being able to live fulfilled lives as social beings.

This manual provides some insights into the limitations of 'models' and 'recipes' for adaptation. It acknowledges the centrality of the affected person and their community at all stages of the processes of adaptation, and understands that physical measures that may be used by people to enhance the sustainability of their communities and production systems are merely tools and physical manifestations of the process of adaptation that people are engaged in. How sustainable these physical measures will prove to be will be dependent on the capacity of people to anticipate change and to maintain their systems.

We hope that you will be able to draw on some of the experiences, concepts, methods and tools provided in this handbook to enhance your practice, and to bring about improvements in the lives of communities affected by increasing climatic variability and change.

GLOSSARY



Action Research A research methodology that blends open-ended, self-reflective inquiry with practical, data-driven problem solving in an interactive group learning environment to inspire beneficial individual and organisational change. Since action research entails being conscientious of one's choice of methods and relationship with others, it is also recognized as a way to increase understanding of how change in one's actions or practices can mutually benefit a wider community. See also Participatory Action Research.

Adaptation An 'adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits benefcial opportunities' (McCarthy, 2001)

Adaptation Baseline A comprehensive starting point for comparison across climate data sets by collating all relevant information about a specific socioeconomic and geographical context prior to the implementation stage of an adaptation project. The UNDP distinguishes between two different types: a project baseline (describing available resources; quality of institutional governance; strength of institutional capacity; pre-existing adaptation strategies at the time of a project's initiation) and a reference scenario baseline (specifically preoccupied with devising plausible future scenarios as reference points).

Aerobic / anaerobic Most living organisms are aerobic, and require oxygen to break down their food to release its inherent chemical energy. Some more "primitive" anaerobic organisms use other mechanisms and do not need oxygen.

Average global temperature This is the result of a complex manipulation of data from thousands of weather stations around the world which measure surface temperature. It is usually used as a relative benchmark to illustrate temperature anomalies (i.e. temperatures below or above the average) rather than as an absolute in itself.

Biodiversity Conservation The management of human interactions with genes, species, and ecosystems so as to provide the maximum benefit to the present generation while maintaining their potential to meet the needs and aspirations of future generations; encompasses elements of saving, studying, and using biodiversity (CBD).

Capacity building In the context of climate change, capacity building is developing the technical skills and institutional capabilities in developing countries and economies in transition to enable their participation in all aspects of adaptation to, mitigation of, and research on climate change, and in the implementation of the Kyoto Mechanisms, etc. (IPCC).

Capacity Development Processes of development of knowledge, skills, and increased agency on the part of individuals and the groups that they are part of to enable them to contribute more effectively to the design, development, maintenance and improvement of organisations, infrastructure and processes that enable them to realise their long-term aspirations for empowerment and improve of their situation beyond an undesirable status quo (Koelle & Annecke, 2010).

Carbon dioxide equivalence (CDE) Different greenhouse gasses absorb heat to different degrees, and also have different lifetimes before they degrade or react with other chemicals. In order to simplify calculations, each greenhouse gas is given a value equivalent to the amount of carbon dioxide than would have the same effect over a long-term period.

Carboniferous Period A period in the earth's history, approximately 350 to 300 million years ago when much of the earth surface was warm, swampy and covered in lush vegetation. This vegetation subsequently became today's coal.

Climate Climate in a narrow sense is usually defined as the 'average weather', or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. The classical period of time is 30 years, as defined by the World Meteorological Organization (IPCC).

Climate change Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity (IPCC).

Climate variability Climate variability refers to variations in the mean state and other statistics (such as standard deviations, statistics of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability) (IPCC).

Community-Based Adaptation (CBA) A people-cantered approach to bottom-up climate change adaptation that upholds local stakeholders' ownership over their development "by facilitating a learning process that increases resilience and anticipatory capacity" (Koelle & Annecke, 2010). CBA consists of a number of contextually specific participatory methodologies focused on enhancing vulnerable communities' problem-solving and networking abilities while fostering mutual support and long-term dialogue between external and local adaptation practitioners (ibid).

Community of Practice (CoP) A group of people who share a craft, a profession and/or a professional practice, and are motivated to share their knowledge and insights in order to improve their performance in this area.

Confidence level In the context of predictions of weather or climate, this refers to the likelihood of a prediction occurring as predicted. For example, a prediction may be presented as "likely" or "extremely likely" to occur. The latter has a higher confidence level. These levels are often expressed in numerical terms (e.g. 95%), the higher the number, the more likely the event will occur.

Cumulative historical emission An estimation of all the carbon dioxide (or greenhouse gasses) released since the beginning of the industrial revolution. It can be expressed as a value for a specific country.

Downscaling A method that derives local- to regional-scale (10 to 100 km) information from larger-scale models or data analyses (IPCC).

Ecosystem The interactive system formed from all living organisms and their abiotic (physical and chemical) environment within a given area. Ecosystems cover a hierarchy of spatial scales and can comprise the entire globe, biomes at the continental scale or small, well-circumscribed systems such as a small pond (IPCC).
Ecosystem-Based Adaptation (EbA) An alternative approach to climate change adaptation, EbA is defined by

the Convention on Biological Diversity as "a strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way." An EBA framework regards human development and sustainable environmental management as interdependent areas for strategic intervention, advancing the idea that livelihood issues such as systemic poverty can be tackled by promoting the resilience of ecosystem settings and services.

Erosion The process of removal and transport of soil and rock by weathering, mass wasting, and the action of streams, glaciers, waves, winds and underground water (IPCC).

Extreme precipitation event This is a technical term for severe rainfall events such as rainstorms, cyclones, hurricanes, typhoons, and other events which cause damage and are not normally expected to occur.

Fossil fuels A term encompassing oil, coal and natural gas that are products of the Carboniferous Period.

Global Warming Potential (GWP) This is related to the CDE in that it refers to the potential that a certain greenhouse gas has in contributing to global warming. This potential is a characteristic of the particular gas' ability to absorb heat and its lifespan in the atmosphere.

Greenhouse effect The process in which the absorption of infrared radiation by the atmosphere warms the Earth. In common parlance, the term 'greenhouse effect' may be used to refer either to the natural greenhouse effect, due to naturally occurring greenhouse gases, or to the enhanced (anthropogenic) greenhouse effect, which results from gases emitted as a result of human activities (IPCC).

Greenhouse Gasses (GHG) A general term for a range of gasses present in the atmosphere which are opaque to light (i.e. transparent), but absorb heat. According to the IPCC, 'Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. This property causes the greenhouse effect. Water vapour (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4) and ozone (O_3) are the primary greenhouse gases in the Earth's atmosphere. As well as CO_2, N_2O, and CH_4, the Kyoto Protocol deals with the greenhouse gases sulphur hexafluoride (SF_6), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs)'.

Heat Energy Heat is a form of energy and is one of the main drivers of weather events. The dissipation of heat causes winds and sea-currents, evaporation rates, etc.

Ice-age Also known as glacial periods, which are lengthy periods (thousands of years or more) where the earth's average surface and atmospheric temperature was significantly lower than it is today (by 2 or 3 degrees), resulting in the expansion of polar ice-sheets into what are today temperate regions, and the expansion of mountain glaciers. Ice ages also affect sea-level since large quantities of water are contained in the ice. Ice ages seems to be cyclical but their cause is not fully understood.

Inter-glacial periods Periods of relative warmth between ice-ages, such as we experience today.

Knowledge Exchange A vital social learning process that supports adaptation processes, and may take place in a variety of forms, usually involving peer communities or representative stakeholders in exchange visits which are particularly conducive to sharing insights and knowledge gained from first-hand experience.

Long wavelength energy Radiant heat (e.g. the heat we feel radiating from a hot stove) is an electro-magnetic wave with a relatively long wavelength. This radiation can be absorbed by greenhouse gasses.

Mitigation An anthropogenic intervention to reduce the anthropogenic forcing of the climate system; it includes strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks (IPCC).

Multilateral Environmental Agreement (MEA) A legally binding agreement between three or more states relating to the environment, predominantly produced by the United Nations.

Multi-stakeholder Engagement The inclusive coordination of diverse stakeholders across public and private sectors in collaborative action-planning or capacity-building processes.

No regrets policy A policy that would generate net social and/or economic benefits irrespective of whether or not anthropogenic climate change occurs (IPCC).

Para-ecologist Members of rural land user communities who act as a link between land users and researcher by participating in knowledge exchange between the two, and gather ecological data in the field. Although para-ecologists do not come from an academic background in biodiversity or environmental conservation, they receive on-site training through monitoring or other fieldwork.

Participatory Action Research (PAR) A participatory research methodology that engages communities as active agents of positive change rather than passive beneficiaries of development assistance. Reciprocal self-evaluation and critical reflection amongst all participants within an iterative cycle of reflection, planning, implementation and observation are essential elements of PAR processes. PAR also "focuses on the effects of the researcher's direct actions of practice within a participatory community with the goal of improving the performance quality of the community or an area of concern" (Reason and Bradbury (2001))

Parts per million (ppm) A term to describe the minute concentration of a substance in solution. For example, current carbon dioxide levels in the atmosphere are about 390 parts per million, meaning for every million molecules air, 390 of those will be CO_2. It is equivalent to 0.0390%. Even smaller concentrations can be expressed as parts per billion.

Photosynthesis A chemical process taking place inside the cells of green plants where carbon dioxide and water, catalysed by chlorophyll, are combined to produce carbohydrates. Light provides the energy source for this chemical reaction.

Projection The potential evolution of a quality or set of quantities, often computed with the aid of a model. Projections are distinguished from predictions in order to emphasise that projections involve assumptions – concerning, for example, future socio-economic and technological developments, that may or may not be realised – and are therefore subject to substantial uncertainty (IPCC).

Resilience The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organisation, and the capacity to adapt to stress and change (IPCC).

Sea-level rise An increase in the mean level of the ocean. Eustatic sea-level rise is a change in global average sea level brought about by an increase in the volume of the world ocean. Relative sea-level rise occurs where there is a local increase in the level of the ocean relative to the land, which might be due to ocean rise and/or land level subsidence. In areas subject to rapid land-level uplift, relative sea level can fall (IPCC).

Short wavelength energy Radiation energy is transmitted as an electro-magnetic wave. The wavelength of this radiation is a function of its energy intensity and other characteristics. Light (and particularly ultra-violet light) is an electro-magnetic wave with a relatively short wavelength and is not absorbed by greenhouse gasses.

Social Learning A core theoretical basis for PAR methodology that regards adaptation as an ongoing, continuous learning process between actors and institutions at all levels of decision making, social learning encourages the creation of hands-on spaces for multi-stakeholder knowledge-sharing and reflection as a buffer against mal-adaptation or an egalitarian alternative to control-and-command adaptation practices (Tschakert & Dietrich, 2010).

Stakeholder A person or an organisation that has a legitimate interest in a project or entity, or would be affected by a particular action or policy (IPCC).

Threshold The level of magnitude of a system process at which sudden or rapid change occurs. A point or level at which new properties emerge in an ecological, economic or other system, invalidating predictions based on mathematical relationships that apply at lower levels (IPCC).

Vulnerability Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity (IPCC).

REFERENCES

Absalom, E. (1995). Sharing our concerns and looking to the future. Participatory Learning and Action, 22.

Archer, E. R. M., Oettlé, N. M., Louw, R., & Tadross, M. A. (2008). 'Farming on the edge' in arid western South Africa: climate change and agriculture in marginal environments. Geography, 93(2), 98-107.

Asfaw, M. (1997). Appraisal of wood fuel supply and demand: a case of Shashemene town, South Ethiopia. (MSc thesis), Swedish University of Agricultural Sciences, Uppsala, Sweden, Uppsala, Sweden.

Ayers, J., Anderson, S., Pradhan, S., & Rossing, T. (2012). Participatory Monitoring, Evaluation, Reflection and Learning for Community-based Adaptation: PMERL Manual - a manual for local practitioners. London: CARE

CARE (2010). Community-Based Adaptation Toolkit.

Davis, C., Engelbrecht, F., Tadross, M., Wolski, P., & Archer van Garderen, E. (in press). Future climate change over Southern Africa, South African Risk and Vulnerability Atlas (2nd Edition ed.). Pretoria: SunMedia.

DEA (2013). Long-Term Adaptation Scenarios Flagship Research Programme (LTAS) for South Africa- Climate Trends and Scenarios for South Africa. Pretoria.

Eriksen, S., Aldunce, P., Bahinipati, C. S., Martins, R. D. A., Molefe, J. I., Nhemachena, C., . . . Ulsrud, K. (2011). When not every response to climate change is a good one: Identifying principles for sustainable adaptation. Climate and Development, 3(1), 7-20. doi: 10.3763/cdev.2010.0060

Gudina, A. T. (2008). The contribution of forest resource to rural livelihoods in Ashoka area of Arsi Negele district, West Arsi Zone of Oromia National Regional State, Ethiopia. (MSc thesis), Hawassa University, Wondo Genet, Ethiopia.

Herriger, N. (2006). Empowerment in der Sozialen Arbeit. Stuttgart: Kohlhammer.

IPCC (2007). Climate Change Synthesis Report of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. In WMO & UNEP (Eds.). Geneva.

IPCC (2014). Climate Change 2014 Synthesis Report of the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. In WMO & UNEP (Eds.). Geneva.

Koelle, B., & Oettle, N. (2009). Adapting with Enthusiasm: climate change adaptation in the context of participatory action research. Paper presented at the Sustainable Land Use Conference, Windhoek, Namibia.

Koelle, B., & Waagsaether, K. (2014). Growing rooibos and a stronger community: participation and transformation. In J. Ensor, R. Berger & S. Huq (Eds.), Community-based Adaptation to Climate Change - Emerging Lessons (pp. 206). Rugby, UK: Practical Action Publishing.

Koelle, B. (2013). Women farmer scientists in participatory action research processes for adaptation. In M. Alston & K. Whittenbury (Eds.), Research, Action and Policy: Adressing the Gendered impacts of Climate Change (pp. 223). Dordrecht: Springer.

Koelle, B., & Annecke, W. (2010). Community Based Climate Change Adaptation (CBA) Adaptation and Beyond (Vol. 01). Nieuwoudtville: Indigo development & change.

Lötter, D. & Le Maitre, D. 2012. Modeling the distribution of Aspalathus linearis (Rooibos tea): implications of climate change for livelihoods dependant on both cultivation and harvesting from the wild. Paper presented at the Arid Zone Ecology Forum, 16 - 18 October 2012, Worcester, South Africa.

Louw, R. R. (2006). Sustainable harvesting of wild rooibos (Aspalathus linearis) in the Suid Bokkeveld, Northern Cape. (MSc), University of Cape Town, Cape Town.

MacKellar, N. C., Hewitson, B. C., & Tadross, M. A. (2007). Namaqualand's climate: Recent historical changes and future scenarios. Journal of Arid Environments, 70 Special Issue Sustainable Land Use in Namaqualand(4), 614.

Malgas, R. R., Koelle, B. R. I., Oettle, N. M., & Archer, E. R. M. (2007). Quenching the thirst of an arid landscape: A case study on the local adaptation strategies adopted by small-scale rooibos tea farmers in response to climate change in the Suid Bokkeveld, Northern Cape, South Africa. In B. Ends (Ed.), Adaptation to Climate Change: how local experiences can shape the debate (pp. 17). Amsterdam: BothENDS.

Max-Neef, M. A. (1991). Human Scale Development: Conception, Application and further reflections. New York: The Apex Press.

McCarthy, J. J. (2001). Climate change 2001 : impacts, adaptation, and vulnerability : contribution of Working Group II to the third assessment report of the Intergovernmental Panel on Climate Change. Cambridge: Published for the Intergovernmental Panel on Climate Change by Cambridge University Press.

Monbiot, G. (2006). Heat. London: Allen Lane.

Nelson, D. R., Adger, W. N., & Brown, K. (2007). Adaptation to environmental change: contributions of a resilience framework. Annual Review of Environment and Resources, 32, 395-419.

Oettlé, N., Arendse, A, Koelle, B, Van Der Poll A. (2004). Community Exchange and Training in the Suid Bokkeveld: A UNCCD Pilot Project to Enhance Livelihoods and Natural Resource Management. Environmental Monitoring and Assessment, 99(1-3), 115-125.

Oettle, N., & Koelle, B. (2003). Capitalising on Local Knowledge: Community Knowledge Exchange. Washington: The World Bank.

Oettle, N. M. (2012). Adaptation with a human face: a case study. Cape Town Environmental Monitoring Group.

Pelling, M. (2011). Adaptation to Climate Change - From Resilience to Transformation. London and New York: Routledge.

Pretty, J., Guijt, I., Scoones, I., & Thompson, J. (1995). A trainer's guide for Participatory Learning and Action. London: IIED.

Reason, P., & Bradbury, H. (Eds.). (2001). Handbook of Action Research: participative inquiry and practice. London: Sage Publications.

Rowley, J., Doyle, M., & Hay, S. (2013). Can we define ethical standards for particpatory work? Participatory Learning and Action, 66, 91-100.

Scharmer, O. (2009). Theory U - Leading from theFuture as It Emerges. San Francisco: Barett-Koehler Publishers.

Tschakert, P., and K. A. Dietrich. (2010). Anticipatory Learning for Climate Change Adaptation and Resilience. Ecology and Society, 15(2): 11.

Wilson, J., & Law, S. (2007). A Brief Guide to Global Warming. London: Robinson.

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