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Learning for the Democratic Republic of Congo in best practices in climate, environment and energy investment in fragile states

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Disclaimer

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[1]Consortium comprises Harewelle International Limited, DD International, Practical Action Consulting, Cranfield University and AEA Energy and Environment

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Acronyms

ACEP	Afghan Clean Energy Project
CAMPFIRE	Communal Areas Management Programme for Indigenous Resources
CBFF	Congo Basin Forest Fund
CFM	Community Forest Management
DAC	Development Assistance Committee
DFID	Department for International Development (UK)
DRC	Democratic Republic of Congo
ESCO	Energy Service Company
FCPF	Forest Carbon Partnership Facility
FIP	Forest Investment Programme
FSI	Failed State Index
JFM	Joint Forest Management
JICA	Japan International Cooperation Agency
MSME	Micro, Small and Medium Enterprise
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
PES	Payment for Ecosystem Services
PV	Photovoltaic
REDD+	Reducing Emissions from Deforestation and Degradation
RESCO	Rural Electronification Services Companies
RPP	Readiness Preparation Proposal
SME	Small and Medium Sized Enterprises
UN REDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
USAID	United States Agency for International Development

List of Fragile States

	Country	FSI Index[2]
1	Somalia	**113.4**
2	Chad	**110.3**
3	Sudan	**108.7**
4	Congo (D. R.)	**108.2**
5	Haiti	**108.0**
6	Zimbabwe	**107.9**
7	Afghanistan	**107.5**
8	Central African Republic	**105.0**
9	Iraq	**104.8**
10	Cote d'Ivoire	**102.8**
11	Guinea	**102.5**
12	Pakistan	**102.3**
13	Yemen	**100.3**

[2]Failed State Index. The Fund for Peace, 2011

I. Provision of Renewable, off-grid energy:

Include solar power, micro-hydro, and fuel-efficient stoves- What challenges have been faced in terms of suitability of technologies, physical access to target populations, ability of customers to pay upfront costs, finance/credit, maintenance, and supply chains, and how have these been tackled?

Wood fuels account for more than three-quarters of energy production in the Democratic Republic of Congo (DRC), and can be attributed to 54% of deforestation[3]. By providing an alternative source of energy, the DRC can drastically reduce its deforestation and degradation rates and well as put the country on a positive trajectory for low carbon growth.

Because DRC is so heavily dependent on wood fuels, improvements in point-of-use through improved stoves can have a significant impact on overall energy demands. Secondly, it is desirable for manyto make the transition from wood fuels to modern energy services, and thus equal attention must be paid to electricity supply.

Improved Stoves

Most energy consumption in rural Africa is for cooking and heating and the vast majority of households use a traditional three stone stove. That type of stove is at best 10% efficient. Improved stoves have been well documented to have a variety of benefits, including significant health improvements and up to 70% fuel efficiency.[4]

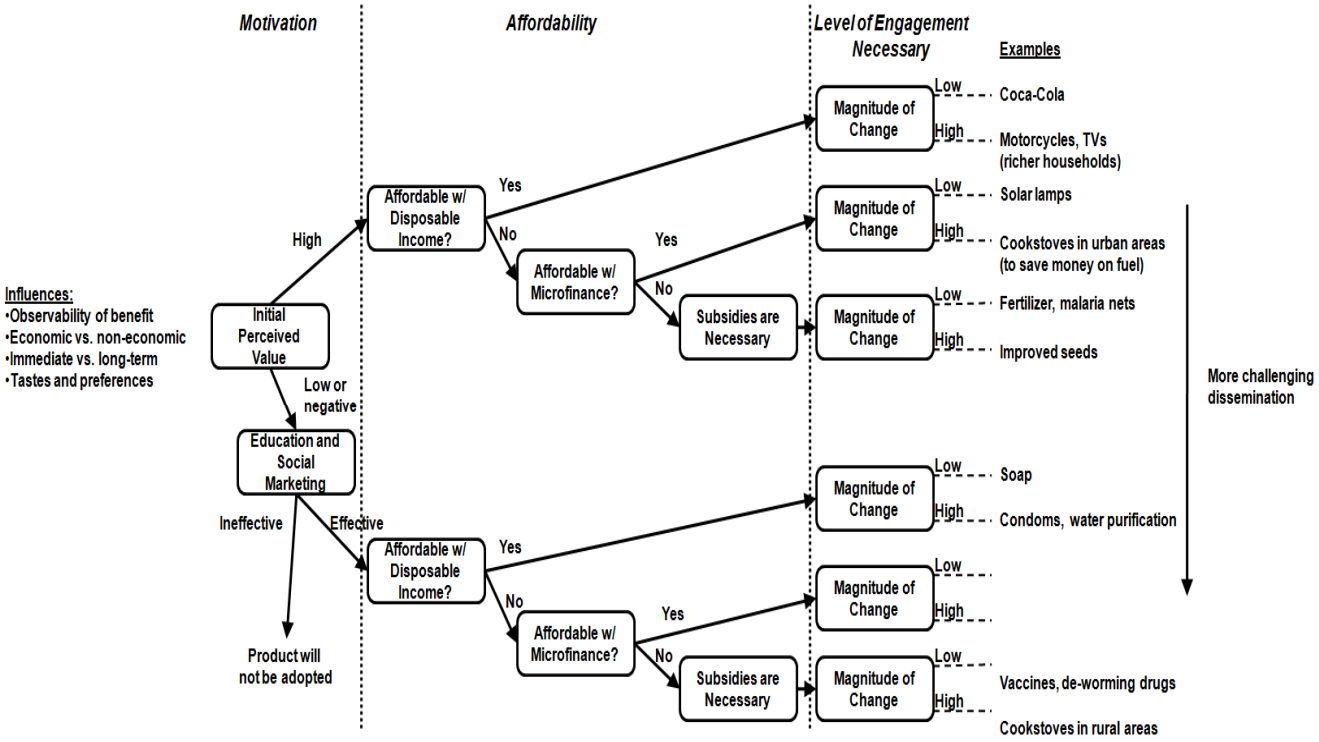

Figure 1: From (Slaski & Thurber, 2009)

[3]Practical Action Consulting, 2009
[4]Practical Action Consulting, 2009

Improved stove projects have historically faced huge challenges in distribution. The target market is rural, and with low population densities makes it difficult to achieve economies of scale. Local manufacture and distribution models have been tried, but quality control and working capital are often cited challenges. One of the biggest hurdles is that improved stoves require a cultural shift in food preparation and heating and unprecedented upfront costs, and thus has low acceptance rates in many communities.[5]The most common form of dissemination is through market mechanisms, discussed below.

The 'Four P's' of marketing: Product, Price, Place and Promotion

As a general rule, marketing includes all the activities that lead to increased profitable sales. At the core of marketing strategies are the so-called 'Four P's' that are the four main pillars of the marketing mix. These include the identification and development of new Products, at an appropriate Price, through distribution channels and selling in the right Places, supported by Promotion.

Product

This 'P' includes the range of products, their quality, the product design, branding, packaging and accompanying services. These key factors should be considered:

— Design and type of improved stove has to meet customer needs – fixed or portable stoves; single pot or two pot stoves etc.
— Stoves need to comply with quality standards that have to be made known to the purchaser.
— Improved stoves need to have a good reputation: to be known as durable and easy to handle.
— Improved stoves have to be attractive for the market, thus they should have status, style, and other desirable product attributes.

Price

To make a profit, the price has to include all the costs associated with producing and selling the item, and still have a profit margin. To get the profit launched it may be necessary for the price to be a 'special offer', or have a low margin until the product is established within the market. The price may include interest if credit is offered.

Place

Planning the location of manufacture, sales and distribution is important:

— Locating workshops close to either raw material supplies or sales outlets will reduce transport costs.
— Sales outlets should be easily accessible and well publicised.
— Sites should be sought out for exhibitions and demonstrations.
— Stove marketing is most promising in areas with severe fuelwood scarcity.

Promotion

Promotion describes any advertising or awareness-raising tactics or activities that serve to attract customers and inform them of products and services. Promotion includes communication strategies and developing a brand image (a corporate design encompassing key information regarding the product). It is conducted mainly through advertisements, personal sales by producers, involvement of celebrities, participation at fairs and exhibitions, public events and public relations.

Figure 2: From(GTZ Hera, 2010)

[5]An often-used analogy is that an improved stove is to Africans as a microwave is to Westerners. While a microwave oven is the most energy efficient appliance we can use, it doesn't have the appeal that our "traditional" stoves do. Microwaves are not appropriate for all food types nor can you use the same types of pots as you use on the stove. Food cooked in a microwave does not have the same taste as it would baked in an oven (or cooked over a charcoal fire as in the case in most of Africa). Though it is a useful tool, it would be difficult to convince most users that it is the best way of preparing a meal.

As can be seen in figure 1[6], cook stoves represent some of the most difficult technologies to disseminate. Lessons learned from a long history of stove projects in developing countries has found that simple allocation of stoves rarely leads to uptake, and that the best dissemination mechanism is through markets. Products can be acquired in two ways; either through training local manufactures or through importation. Benefits and challenges of each approach are summarised in the table below.

To ensure a successful programme the follow steps must be taken:

1) Assessment of requirements of end-users to establish the best stove model(s)
2) If needed, facilitation of capital to acquire products. This can either be in the form of working capital loans to local manufacturers or facilitation of the importation of mass-produced products
3) Acquisition of appropriate product- either through training of local manufacturers or importation of mass-produced stoves.
4) Monitoring and quality control of stove production (if necessary)

Table 1: Comparison of Stove Sources:

	Benefits	Challenges	Examples
Local	• Cost • Short supply chains • Job creation • Manufacturers have personal responsibility to customer • Local knowledge of product • Reparability	• Quality control • Monitoring • Scale • Knock-offs from untrained manufacturers can ruin product reputation • No international branding • Lack of working capital • Difficult to achieve economies of scale	• Mirt Stove (GTZ Ethiopia) • Angai Stove Sri Lanka
Imported	• Quality • Usually they are technically better performing • Reliability • Desirability of an imported product • Branding/Marketing • Scalability • Monitoring	• Cost • Long supply chains • Spare part availability • Lack of local knowledge • Local product applicability	• Envirofit • Prakti Design

[6] Slaski & Thurber, 2009.

Off-Grid Electricity generation

Below is a comparison of the various types of off-grid, low-carbon electricity generation mechanisms[7].

Table 2: Comparison of off-grid energy generation technologies adapted from (Practical Action Consulting, 2009)

Energy	Advantages	Constraints
Hydro power	Huge potential, mature technology, sufficient power to meet all electricity needs, potential for local manufacturing, preliminary identification of more than 300 sites, existence of some preliminary feasibility studies, most cost effective compared with other options	High initial capital cost (US$ 3,000 to 4,000/kW), additional technical and social studies, necessity to develop capacity building for turbine local manufacturing, private investment and/or community participation required, thousands of communities and villages without potential
River turbine	Huge potential and suitable for very low head (complementary to micro hydro), robust and simple technology, potential for local manufacturing. Prototypes tested, however mixed results, could be cost effective	Further testing required, technology transfer and capacity building required
Solar Photovoltaic	High and regular potential, mature technology, existence of local capacity by local installers and maintenance, could be developed where hydro potential non available, quick implementation when funding available, easy to maintain	High capital cost per unit, limited to household (lighting, ventilation, communication) or social energy services
Wind energy (electricity generation, water pumping)	Mature technology, could be cost effective	Wind map not available, necessity to assess wind potential of specific sites before implementation (wind and speed and yearly distribution), maintenance
Biomass and waste (biogas, gasifiers)	Potential for considerable energy savings and large programme for energy efficiency, mature technologies in the case of biogas and energy efficiency technologies, low cost for biogas and efficient technologies (kilns, improved stoves),	High capital costs for gasifiers, Biogas and efficient technologies limited to household energy needs
Biofuels	Land Availability, potential to meet all the needs, international experience, could be labour intensive.	Land tenure and ownership, possible conflicts with food production, complex mechanisms involving agriculture and energy. High capital for the whole supply chain (plantation and energy). Significant environmental impact for large programme Do not necessarily target rural areas
Grid extension	Access to all modern energy services, cost effective for high density population close to medium voltage line	Most communities and villages are far from the grid.

[7]Practical Action Consulting, 2009.

Delivery Modules

There have been a number of innovative distribution mechanisms that allow for wide dissemination while minimizing the cost of electricity to end-users.

Table 3: Highlighted energy supply mechanisms[8]

Type	Mechanism	Distribution	Example of use
Energy Service Company (ESCO)	Private sector through government concession or market	Grid	Western countries
MSME (micro, small and medium enterprise)	Local private enterprises selling energy products	Point-of-use at household (solar PV or improved stoves)	World Bank and Shell Foundation projects
Energy Consumer Society	Community participation in the management and ownership of system	Mini-grid	Developed and tested in Sri Lanka
Small Enterprise Model	Private local enterprise manages day-to-day use and collects tariffs for use, leases the system from government	Mini-grid	Developed and implemented in Peru
Community Share holder	Operation and administration by a private company comprised of user shareholders, Investment and implementation by government	Mini-grid	World Bank (limited information available on its success)
Electricity Community Cooperatives	Property and assets in hands of community	Mini-Grid	
Rural Electrification ServicesCompanies(RESCO)	Capital investment by international body, managed by community members	Mini-grid	Promoted by Electircite de France in South Africa
Decentralised Virtual Utilities	Ownership of household systems by private enterprises, charge users a fixed fee for service	Household	
Energy Equipment Retailers	Small-scale technologies distributed through small dealer networks	Household	
Creative Concessions	Government offers to provide electricity to a region through a tending process with the winner signing a concession contract of electricity. Often requires subsides to serve isolated areas	Mini-grid/grid	

Further information in response to this question is given in Annex 1.

[8]Practical Action Consulting, 2009

II. Payment for ecosystem services:

Are there examples from fragile states and how have these avoided state capture (for example through community management populations, ability of customers to pay upfront costs, finance/credit, maintenance, and supply chains, and how have these been tackled)?

There are few examples of Payments for Ecosystem Services (PES) projects in fragile states and fewer in Africa. According to (Pagiola, Arcenas, & Platais, 2005)the poor can only participate in Payment for Ecosystem Services (PES) schemes if they are:

1) eligible (geographically and ecologically situated for the scheme)
2) disposed (payments are greater than opportunity costs)
3) able (secure property rights)

As is the case of most of the Congo Basin, property rights are at best vague, and thus prevent PES schemes from being successful.[9]

Despite the lack of evidence of the success of PES schemes in Africa, there are some donors who pursue this mechanism. A few examples of these schemes are highlighted below. Please see the attached documentation for full project summaries.

Case studies of PES in Fragile States:

IbiBatéké Degraded Savannah Afforestation Project
Democratic Republic of Congo

The target of this project is to convert 4,200 hectares of natural savannah into a sustainable fuel wood supply for charcoal production. By engaging the local population, this project is curbing the destruction of natural forests and concentrating on planting managed forests. The managed forests will comprise of acacia, eucalyptus and indigenous species that will sequester carbon and provide a source of fuel wood for Kinshasa. Natives of the Batéké region founded a group called NOVACEL, which developed this project. The BioCarbon fundfinanced the upfront cost through private sector loans. Additional funds are from a carbon buyer, Orbeo, a subsidiary of SociétéGenerale and Rhodia. No information was disclosed on the method of financial disbursement, and thus it is impossible to comment on to what extent payments have avoided state capture.

[9]Swallow, 2007

Kenya: Agricultural Carbon Project
Kenya

This project targets small-holder farmers and Small and Medium Sized Enterprises (SME) entrepreneurs to access carbon markets to receive carbon revenues in exchange for adoption of technologies and practices that mitigate the production of green-house gases. This is done through the adoption of sustainable land management practices to increase crop yields and farm productivity, carbon sequestration and rehabilitation of degraded land. The economic benefits will be based on the farmland productivity gains and the payment for ecosystem services for the rehabilitation of degraded land. This project will target 45,000 hectares in the Nyanza and Western Provinces and will be developed by the NGO ViAgroforesty. No information was disclosed on the method of financial disbursement, and thus it is impossible to comment on to what extent payments have avoided state capture.

Communal Areas Management Programme for Indigenous Resources (CAMPFIRE)
Zimbabwe

Though not a PES scheme in its strictest definition, the CAMPFIRE project has a long history that can provide lessons about implementation and performance to more traditional PES schemes.

In the 1960s wildlife in Zimbabwe was the legal property of the State. Because of degradation of natural habitats, wildlife migrated to areas of agricultural land, putting it in conflict with the farmers of that land. To ease this conflict, CAMPFIRE was created to allow farmers to get financial benefits from wildlife resources. Communities were given custody and the responsibility for managing wildlife resources, and the right to benefit directly from their use, mostly through offering safari hunting and eco-tourism.

Rural District Councils (RDCS) are the wildlife authorities and give the producer communities a fixed percentage of 50% of the revenue earned. A further 35% is allotted for the management of wildlife through habitat management; employment of game rangers, monitoring and other similar activities and 15% is retained by the RDC. Since its inception in the 1980s, CAMPFIRE has now expanded to 37 RDCs and 244,000 km^2 of land, though just over 60% of those RDCs are functional. Of those 23 functional RDCs only 12 have a reliably marketable quota of wildlife for hunting or tourism. A diagram of the CAMPFIRE structure is illustrated below.

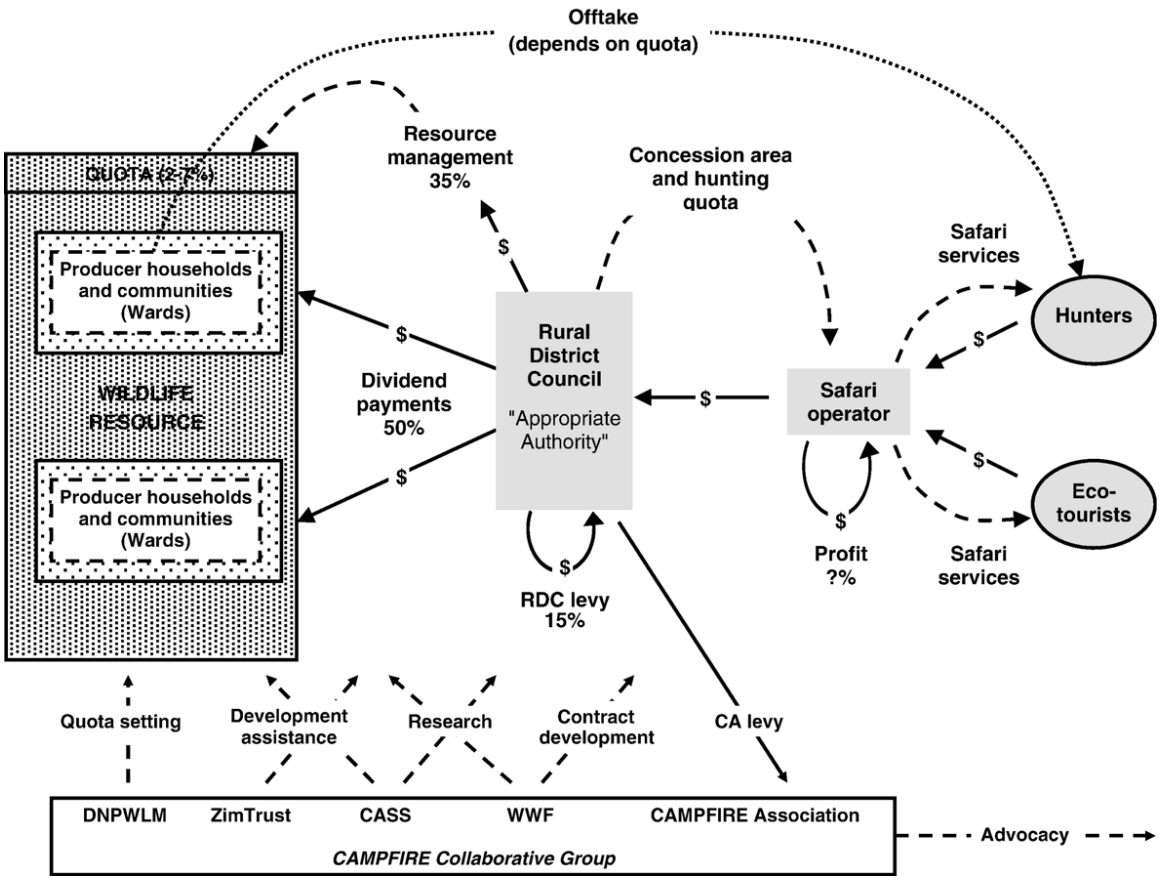

Figure 3: General structure of CAMPFIRE in Zimbabwe. Financial transfers are in bold lines and resource offtakes are in dotted lines. Services (including by the CAMPFIRE Collaborative Group) are dashed. (Bond & Frost, The CAMPFIRE programme in Zimbabwe: Payments for wildlife services, 2008)

The estimated financial benefit at the household level from this scheme varies widely depending on the productivity of the ward. Some households in the most productive regions received substantial finical benefits, exceeding their gross income on all agriculture sources. Conversely, some households in the least productive areas did not receive enough to offset their opportunity costs. On average, households received approximately 11% of their gross income from agriculture, enough to supplement, but not replace their agriculture income.

III. Climate Resilient Investments:

To what extent have interventions in other fragile states broadened their concept of individual and community resilience beyond humanitarian resilience to incorporate adaptive capacity to acute and chronic climate and environment challenges? To what extent have locally appropriate climate resilient technologies been used in fragile states to strengthen development investments?

An initial search for evidence in relation to the above subject area yielded few results with no evidence located of interventions, in fragile states, that broaden the concept of individual and community resilience to incorporate adaptive capacity to short or long term climate and environment challenges. Additionally, no evidence of locally appropriate climate resilient technology (used in fragile states) to strengthen development investments was found.

There are some references – in transitional and emerging economies – that address both categories mentioned above. The context is however considerably different in these economies; governance and democratisation have taken hold and concepts related to decentralisation, individual and community empowerment, transparency, security of tenure and (genuine) community-based natural resource management are flourishing. In the case of fragile states like DRC these concepts will remain inspirational until the base conditions related to good governance, transparency and democracy become more firmly established.

Since this initial search further work has been undertaken that addresses climate, environment and energy investments in fragile states. The findings of this work are attached in annex 1.

IV. Urban planning projects:

Has there been a focus in any fragile states on ensuring that rapidly growing cities develop in a low carbon, climate resilient way, for example in terms of water supply, physical infrastructure including housing and settlements, transport, ecosystem, energy provision and industrial production?

There are a number of low-carbon infrastructure or urban planning projects documented under major donors. A large number are from the World Bank Official Development Assistance (ODA) loans as well as significant work in Afghanistan and Iraq by United States Agency for International Development (USAID). Below are some highlighted projects from these donors, but is not an exhaustive list of such activities. Full project data sheets can be found in the supplementary documents supplied with this document.

Project: Kenya Informal Settlements Improvement Project (KISIP)
Donor: World Bank

Country: Kenya

The objective of this is to improve living conditions in informal settlements in selected municipalities in Kenya. This will be achieved by enhancing security of tenure and improving infrastructure based on plans developed in consultation with the community. This project has 4 components: strengthening institutions, enhancing tenure security, investing in infrastructure and planning for urban growth.[10]

Project: Kabul Urban Reconstruction Project for Afghanistan

Donor: World Bank
Country: Afghanistan

This project aims to improve the delivery of basic urban services through improvements in infrastructure in under-served communities in Kabul. It will address challenges resulting from the often-conflicting agendas of emergency response and long-term development agendas.

Project: Taiz Municipal Development and Flood Protection

Donor: World Bank
Country: Yemen

This project targets 10,300 and 450 businesses by building resiliency against seasonal flash flooding that has been exacerbated in recent years. The project will upgrade municipal infrastructure in flood protection areas and will have a capacity building component to strengthen the local government's ability to deliver services.

Project: Afghan Clean Energy Project (ACEP)

Donor: USAID
Country: Afghanistan

The ACEP was designed with the intention of rebuilding many of Afghanistan's cities damaged by war with low-carbon, clean energy. They have three main targets:

1. Power Generation: This project aims to provide 700,000 beneficiaries to have clean energy through hydro, solar and wind power generators and irrigation pumps.
2. Energy Efficiency: By improving the Afghan distribution system through utility management, there can be significant energy savings.
3. Off-Grid energy: This project will provide solar street lamps, solar lanterns and solar hot water heaters across the Kandahar, Kapisa, Kabul, and Hirat provinces.

Project: Ghazi Barotha Hydropower Project (I) (II)

Donor: Japan International Cooperation Agency (JICA) and World Bank
Country: Pakistan

The GhaziBarotha Hydropower Project opened in 2001 and supplies 1450 Megawatts of power to the grid. Its close proximity to Islamabad makes it vital to the power supply of the city.

Project: Deralok Hydropower Plant Construction Project

Donor: JICA
Country: Iraq

After longtime sanctions and the devastating effects of the Iraq War in 2003, the current state of Iraq's grid is in severe disrepair. This project aims to rebuild energy infrastructure in Iraq with low carbon, clean technology and will do so through constructing a 30 Megawatt hydropower plant. The plant is due to open in 2016.

V. REDD+:

Are there any examples of fragile forest nations where REDD+ is being successfully delivered?

Fragility is a clear concern for REDD+ (Reducing Emissions from Deforestation and Forest Degradation) countries, as governance is a critical component of a successful REDD+ mechanism.(Harwell, 2010) Over half the countries currently involved in some REDD+ initiatives are more fragile than the average FSI for non-OECD countries. Moreover, many REDD+ countries are involved in varying levels of conflict- as demonstrated in the figure below(Harwell, 2010).

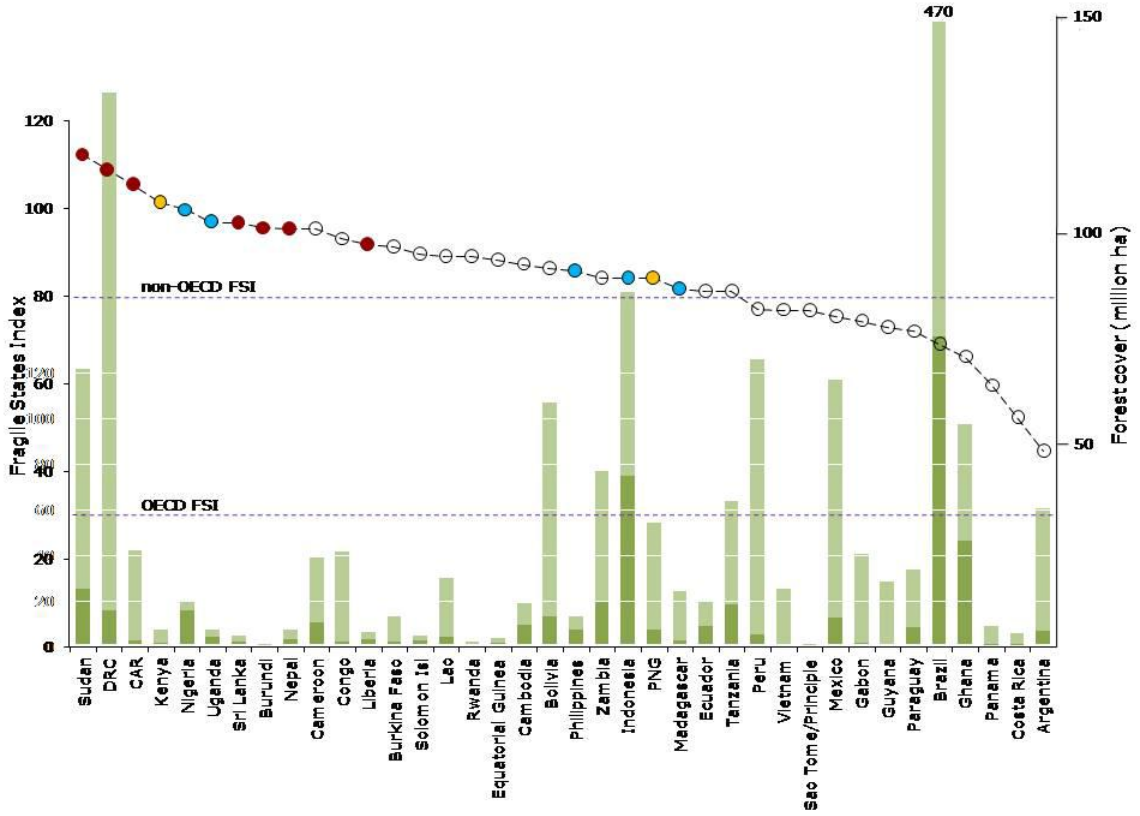

Figure 4: The circles in this figure represent the values of the US Fund for Peace Fragile States Index (FSI). The red circles are those with peace keeping operation**s** within the last five years, the yellow are those with major internal ethnic conflicts in the last five years and the blue are those with ongoing insurgencies or political conflict. **The light green bars represent total forest cover, while the dark green portions represent what area of forest would be lost if current deforestation rates continue over the next 25 years[11].** Source: **(Harwell, 2010).**

To establish whether there were other fragile forest nations that could be compared to the DRC in terms of REDD+ programmes, countries were analyzed according to three criteria. They must be a fragile state (classified as “Critical” on the FSI Index), they must be a “forest nation” (defined as having a significant percent forested land area), and

[11]Interesting to note is that though the DRC has the second highest total forest cover; it has a slow deforestation rate, and thus stands to lose only a small area of forest at current deforestation rates.

must be actively delivering REDD+ programmes. The table below summarizes these criteria, and shows that only four fragile states are participating in REDD+ programmes. (Cameroon, Republic of Congo and Gabon were added for reference, but are classified as "In Danger" on the FSI list, and thus are not considered fragile states). Of those countries involved in REDD+, only the DRC and the CAR have any delivery of services. Kenya and Ethiopia are currently only in the process of formulating a Readiness Preparation Proposal (R-PP).

Table 4: Extent of forests and REDD+ projects in fragile states

State	FSI[12]	% of Country Forested[13]	REDD+ Funds[14]
Somalia	113.4	11.18%	-
Chad	110.3	9.28%	-
Sudan	108.7	26.96%	-
DRC	108.2	58%	UN-REDD, FIP, FCPF, CBFF
Haiti	108.0	1.50%	-
Zimbabwe	107.9	66.35%	-
Afghanistan	107.5	0.25%	-
CAR	105.0	36.53%	FCPF, CBFF
Iraq	104.8	1.88%	-
Cote d'Ivoire	102.8	9.30%	-
Guinea	102.5	27.35%	-
Pakistan	102.3	5.31%	-
Yemen	100.3	0.85%	-
Nigeria	99.9	12.0%	-
Niger	99.1	8.0%	-
Kenya	98.7	2.27%	FCPF
Burundi	98.6	4.5%	-
Burma	98.3	63.64%	-
Guinea-Bissau	98.3	57.36%	-
Ethiopia	98.2	3.56%	FCPF
Cameroon	94.6	44.68%	FCPF, CBFF
Congo (Rep)	91.4	65.7%	FCPF, CBFF
Gabon	75.3	85.00%	FCPF, CBFF

Key:
CBFF Congo Basin Forest Fund
FCPF Forest Carbon Partnership Facility
FIP Forest Investment Programme
UN-REDDUnited Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries

Comparing the CAR and DRC, there is also a large gap in levels of investment in REDD+ programs. DRC has approximately ten times the funding as the CAR, and thus has more extensive programs.

[12]The Fund for Peace, 2011
[13]Convention on Biological Diversity, 2011
[14]Voluntary REDD+ Database, 2011

Table 5: Summary of REDD+ projects in fragile states

State	Funds (Report by State)[15]	Funds (Reported by others)[16]
Central African Republic	$0.22 million	$11.13 million
Democratic Republic of Congo	$27.4 million	$106.66 million

The conclusion to be drawn from this is that there are no other REDD+ programmes in fragile states that are comparable to the DRC.

How are the challenges of state capture and perverse incentives from REDD+ financial flows managed?

Conceptually, a state- based financial mechanism for REDD+ disbursement in a fragile state is not possible, particularly in countries where deforestation can largely be attributed to food and charcoal supply, as is the case in DRC. This means significant measures would need to be taken to provide communities with alternative livelihoods and energy supplies. According to the Organisation for Economic Cooperation and Development/Development Assistance Committee (ODEC/DAC) definition of "fragile states", a key characteristic of the state is one in which there is a, *"lack of political will and/or capacity to provide the basic functions needed for poverty reduction, development and to safeguard the security and human rights of their populations."*

The assumptions in a "performance-based" payment approach assumes that states are in a position to make policy decisions that alter their development trajectory based on the basis of long-term cost/benefit calculations, and that once those decisions are made, that the state is in a position to implement them.

Currently, the natural resource governance of the DRC has been unable to curb destructive subsistence agriculture, which is responsible for 54% of deforestation. Without significant reforms to these structures, it is unlikely that REDD+ can make any sustainable reductions in deforestation and forest degradation. [17] Thus, it is necessary to focus on the underlying causes of deforestation and address safeguards to ensure any REDD+ programmes achieve their stated goals.

As demonstrated below, reducing deforestation from slash and burn agriculture, pastureland conversion and timber harvesting are some of theleast expensive interventions per ton of carbon dioxide that can be done in forestry. Moreover, those interventions account for nearly 50% of the abatement potential in forestry, and should be given careful consideration in future REDD+ programmes.

[15] Voluntary REDD+ Database, 2011
[16] Voluntary REDD+ Database, 2011
[17] Costenbader, 2011

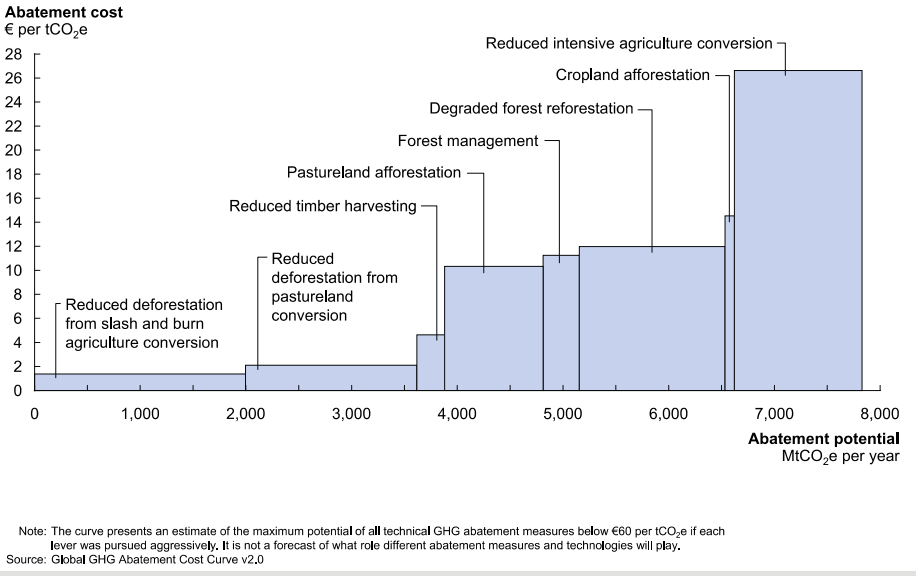

Figure 5 GHG abatement curve for forestry from (McKinsey & Company, 2009)

The governance capabilities needed to address weaknesses in fragile and conflict affected states in order to protect forests and forest dependent people include:[18]

a. Clear tenure, based on law
b. Participation, especially of forest dependent communities in forest management decision making
c. Anti corruption mechanisms

The three major policy approaches that could be used in REDD+ initiatives are summarized in the below table[19], and analyzed against four key indicators of Equity, Efficiency, and Effectiveness. Land tenure implications are stated in the last row.

[18] Harwell, 2010
[19] Costenbader, 2011

Table 6: Comparison of REDD+ Policy Approaches from: (Costenbader, 2011)

	Payment for Ecosystem Services (PES)	Participatory Forest Management (PFM)	Forest Concession Revenue-Sharing
Equity	(+) Potentially high if poor/marginal groups targeted	(-) JFM: Likely low return of benefits to local communities (+) CFM: Potentially high if poor/marginal groups targeted & liabilities shared	(-) Potentially low if small-holder exclusion (both from customary lands & from benefits)
Efficiency	(+) Good if opportunity costs continually estimated (-) Transaction costs in upscaling	(+) Wide potential group of beneficiaries if mixed with SF (-) Transaction costs in upscaling	(+) Low transaction costs, easily upscaled (-) Likely over-/under-payments (if uniform central payment scheme)
Effectiveness	(+) Potential for long-term sustainability (+) Potential for multiple PES instruments	(+) CFM: incentives if locally-owned /benefits (-) JFM: likely low if state-owned/controlled	(+) Provincial mgmt. allowing for local opportunity cost estimates (-) National management using uniform RS split
Land Ownership / Tenure Regime	Likely private ownership & control (but need to clarify tenure)	Mixed: • CFM: more private ownership/control • JFM: state ownership/ control	Likely state ownership; private control for term of leasehold

Key:
CFM Community Forest Management
JFM Joint Forest Management

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Annex 1

DFID DRC is seeking to learn from climate, environment and energy investments in countries with comparable governance and security environments. While there is a wealth of experience and examples from emerging economies and non-fragile least developed countries, we are aware of far fewer lessons learned from post-conflict and fragile states:

1. **Provision of renewable, off-grid energy, including solar power, micro-hydro and fuel-efficient stoves. What challenges have been faced in terms of suitability of technologies, physical access to target populations, ability of customers to pay upfront costs, finance/credit, maintenance, and supply chains, and how have these been tackled**

Response

Available evidence of energy investments in fragile states is limited. Available information tends to be derived from ad hoc studies in the form of reports or articles, identifying studies that focused on fragile states was challenging. Perhaps this is due to the bias of case studies toward successful interventions. In particular, emergency interventions do not seem to prioritize energy needs over education, water and sanitation, and gender. Increasingly, cooking is seen as part of emergency planning but most other energy needs in refugee camps seem to be addressed via conventional energy solutions. Of the many programs that Oxfam and CARE carry out in fragile countries, evidence was lacking that addressed energy explicitly.

The major agencies such as USAID, WB, AFDB have several programmes in the field of energy in post conflict/post disaster situations, but they seem to focus on rewiring towns and supporting large-scale schemes rather than off-grid smaller ones. Agencies specifically focusing on energy, such as AREED, AFRPREN etc, tend to intervene in stable countries rather than fragile ones. Within GEF's database of interventions, post-intervention documents such as evaluations are not available for most projects, and where these were available, no suggestions for improvement can be derived, or if they are, they have not been tested in the scope of the project.

Most of the experience in this sector becomes obsolete very shortly. Advancements in technological solutions and business models in the sector is rapid and observations regarding the cost of wind or solar systems affecting affordability made in 2005 are most likely to be completely irrelevant now.
Several NGOs are operating in the 'fragile states' in this sector, however information is not easily accessible.

An increasingly vast number of private businesses and mixed social enterprises (such as eight19, SolarAid, Dlight etc) are operating in fragile states. Their experiences would be the most valuable to draw lessons from. PV solar is a fast spreading technology, probably because it addresses needs and at the micro scale is an "off the shelf" solution that needs little infrastructure, thus making it ideal in places where that is lacking.

Table 1 (below) maps case studies of renewable off-grid energy projects in fragile states, summarising the challenges faced and strategies implemented to overcome these.

Table 7

Date	Country	Organisation	Theme	Project Description	Challenges	Challenge Type	Strategies	Source URL
2010	DRC, Burma, East Timor, Indonesia	Mercy Corps	Cookstoves, Forest management	DRC. Addressing gender violence from fuel collection through programme on fuel-efficient stoves and agroforestry for fuelwood production. Myanmar. Addressing hostility between residents and floods displaced population. Mangrove tree planting and introduction of fuel efficient stoves. East Timor. Deforestation resulting in more frequent, localised disasters due to fires or landslides. Introduction of fuel efficient stoves, development of small timber plantations or woodlots to reduce consumption and provision of lighting. Mentawai, Indonesia, following tsunami.	In DRC, stoves locally sourced were not much better than open fires. In general, refugees receiving handouts for free and having impact on local natural resources creates hostility with local population.	Supply chain, affordability	Cash-for-work planting programmes, such as land restoration or growth of fuel crops, which also inject money into a new local economy very quickly and potentially provide benefits to host communities. The disaster response offers a transitional period where new technologies and cheaper, more effective ways of doing things can be introduced. Relief intervention can be done by boosting the local economy by introducing cheaper energy efficient products in the traditional value chain. This includes high quality fuel efficient stoves, solar lighting as part of security measures.	http://hedon.info/BP59_Interview%20with%20Jim%20Jarvie
2010	Ethiopia, Haiti	Project Gaia	Cookstoves	Providing ethanol stoves (Electrolux, Sweden) to refugee camps (Shimelba Camp - Tigray, Bonga Camp - Gambella and	Ethiopia. Supply of ethanol competes with fuel blending for transport prioritized by Gov through its state-owned sugar factories.	Supply chain, Logistic	Ethiopia. A micro distillery is to be built by the project run by SME. Haiti. To free goods from customs in harbour, work	http://hedon.info/Project-Gaia-Jumpstarting-Emergency-Interventions-

Date	Country	Organisation	Theme	Project Description	Challenges	Challenge Type	Strategies	Source URL
				Kebrebeyah Camp - Somali Regional State). Planning to produce stoves in Addis Ababa through partner SME and open micro distillery. Providing ethanol stoves after earthquake in Haiti, Brazil was to provide fuel (initially donated) until local production could be developed.	Supply was interrupted in 2009. Haiti. Plans were to ship stoves asap but took time to create partnerships and when ready, first container-load of stoves was severely delayed due to bureaucratic obstacles by government. Shipment of fuel from Brazil also had to be delayed.		with government but also with local partners. Also set up of local stove production with local SME and work with farmers to start ethanol production from sugar cane to avoid import all together. Attention from international donors creates opportunity for access to funds to implement activities. Loans to private businesses would help the set up of micro distilleries	for-Sustainable-Development
2010	Pakistan, Afghan refugee camp	EMMA toolkit team	Fuel	Use EMMA tool to assess the effects that dislocated population had on the local firewood market		Supply chain	The supply chain was judged to have the capacity to supply the influx of refugees. Cash assistance was recommended.	http://hedon.info/BP59_Value%20chains%20in%20emergencies_Firewood%20for%20Internally%20Displaced%20People
2004	Zimbabwe	GNESD	Solar PV	Installation of solar PV in rural areas	Zimbabwe's experience with offgrid electrification initiatives (mainly SHS) has not been satisfactory when compared to the grid-based Rural Electrification Programme. Although a significant number of these systems have been disseminated in rural areas, a profound problem with them has been the high cost of	Maintenance	In response to the high cost of solar panels, the Government waived duties on solar technologies, resulting in an increased demand for the systems. Subsequently, however, duties were re-introduced and this had an adverse effect on the rate of dissemination of SHS (Karekezi, et al, 2002). With regard to the performance of the systems installed, Zimbabwe has experienced	http://www.gnesd.org/Downloadables/Energy_Access_I/Technical_report_ERC_ver_16_April_2004.pdf

Date	Country	Organisation	Theme	Project Description	Challenges	Challenge Type	Strategies	Source URL
					solar panels and a high failure rate of the systems.		mixed results from the various projects. For example, two years after installation of SHS under the GEF Project, about 30 per cent of the systems had failed (Mapako & Afrane-Okese, 2002). In general, it has been observed that donor-funded projects were more prone to failure than privately implemented ones.	
2004	Sudan	Practical Action	Cookstoves	Switching from biomass to LPG for cooking (monitoring exposure to Indoor Air Pollution (IAP) exposure before and after). Pilot with participatory methods followed by scale up phase. Partnering with local organisations and institutions. Reached 112 hhs, another 137 planned.	Some women worried about security. Bulk cost and availability of refill resulted in some defaulting households.	Technology, Affordability, Supply chain	Affordability. Deal with LPG to accept an advanced of 50% of the cylinder cost and the remaining 50% paid in six monthly installments. Revolving fund to support local partner to sell gas cookers at better price with cash or with short term installments. Supply chain. Assessment of capability of local partner to keep up with demand showed positive results. Trained in management and organization of revolving funds. More training planned on maintenance, tech risks etc. Technology. Perception of technology being dangerous has been addressed through training and TV ads.	http://practicalaction.org/media/preview/6738
1996	Mauritania	GEF	Micro wind	Install micro wind in rural location involving NGO and private partners, local	Project overestimated consumption at the household level (competition with other	Maintenance, Financing	Good practice: Participation of village in initial investment Payment of monthly fee	http://www.gefonline.org/ProjectDocs/M&E/Documents%

Date	Country	Organisation	Theme	Project Description	Challenges	Challenge Type	Strategies	Source URL
				committee. At the time of the review the project was 80% complete 8/10 villages. N.B. Comments are based on early evaluations.	solutions, seasonal variations due to nomadism). Battery needs not foreseen properly. Current pricing does not cover initial investment Costs were higher than expected. For the private sector to get involved margins must be sufficiently high. Villages in this case were too small for the company to get involved.		agreed Agreement to pay for maintenance contract in advance.	20and%20data/DatabaseContent/TE/Other%20TEs%20from%20before%202001/371%20Mauritania%20Decentralized%20wind%20electric%20power%20PiMS%203086.pdf
2005	Mauritania	GEF	Solar, wind-hybrid	Adrar Solar Initiative and Decentralized Electrification in the Northern Coastline of Mauritania through Hybrid (Wind/Diesel) Systems.	Cancelled.			http://gefonline.org/projectDetailsSQL.cfm?projID=2386
1997	Zimbabwe	GEF	Solar	Photovoltaics for Household and Community Use.	Weak management, no technology transfer Potentially the project referred to by GNESD above.			http://www.gefonline.org/ProjectDocs/M&E/Documents%20and%20data/DatabaseContent/TE/1997/CC%20UNDP/374%20Final%20evaluation%20PV%20Zimbabwe.pdf

2. **To what extent have interventions in other fragile states broadened their concept of individual and community resilience beyond humanitarian resilience to incorporate adaptive capacity to acute and chronic climate and environment challenges?**
3. **To what extent have locally appropriate climate resilient technologies been used in fragile states to strengthen development investments?**

Response

The literature on the subject of lesson learning for climate change adaptation and resilience building in fragile states tends to focus on two strands of research and recommendations – a) climate change impacts fuelling conflict; b) effective adaptation in fragile states. This focus tends to be on – physical infrastructure, machinery and equipment (hardware), knowledge and skills (software), capacity to organise and use all of these (orgware), and biotechnology. Both of these issues are discussed below, with a focus on effective adaptation, followed by a summary of case studies (see Table 2) where locally appropriate climate resilient technologies were used in fragile states.

A. Climate impacts as a cause for conflict

There are a number of research studies and initiatives exploring the impacts of climate change on conflict in fragile states, identifying a causal relationship. Discussions in this tend to focus on existing conflict being heightened due to disputes over depleting water resources. Recommendations highlight the importance of conflict-sensitive adaptive planning – i.e. considering the impacts of adaptation initiatives on the local political, economic and social contexts, and ensuring that existing conflicts will not be further fuelled by the resilience-building interventions being proposed. Effective conflict-sensitive adaptation will consider whether and how the intervention will affect conflict – will the intervention provide economic incentives against violence? Will it improve relations between communities and government, or bring divided neighbours together? Initiatives should be assessed against the governance situations and conflict dynamics of the areas they are intending to support – understanding the local context, power relations and economics is crucial. (Sayne, A. 2011, “Climate Change Adaptation and conflict in Nigeria”, UNIP Special Report).

B. Effective adaptation and resilience building in a fragile context

Fragile states, where the state is unable or willing to perform functions necessary to meet the basic needs and expectations of their citizens, pose challenges to efforts to adapt to climate change. In such contexts, vulnerability is often compounded by extreme poverty, poor infrastructure, limited access to markets, weak institutions, political instability and the threat of violence. State fragility means that there is little or no social safety net to support the most vulnerable to cope with climate impacts. Given that fragile states already struggle to maintain control and legitimacy in current conditions, the social and economic impacts of climate change are likely to generate demands which they will be unable to meet and may be overwhelmed by. Fragile states also present challenges for channelling and disbursing adaptation finance given their already limited absorptive capacity and the potential for elite capture and corruption.

More specifically, adaptation initiatives in fragile contexts are often hampered by a lack of reliable climate forecasting information to inform adaptation planning; poor awareness amongst community members of the impacts of climate change; weak governance structures and therefore poor coordination; and limited resources for effective communication of climate forecasting.

Effective adaptation initiatives would involve steps to ensure adaptation processes and policies are conflict-sensitive and 'do no harm' (through e.g broad-based participation, taking account of issues of power distribution and existing social tensions). At the same time, it could also mean climate-proofing peace building initiatives (by e.g conducting climate change impact assessments of post-conflict reconstruction and reintegration programmes). A further consideration is to better plan for and peacefully cope with climate-related migration. These approaches are relatively new however, and there remains little guidance on integrating conflict-sensitive approaches into adaptation programmes and no reference to conflict-prevention or peace building is given in adaptation frameworks or policy.

Others call for a more nuanced approach based on empirical context-specific political analysis. Given that adaptation itself is highly a political process which involves struggles and power relations, this perspective cautions against the simplistic assumption that adaptation interventions can necessarily contribute to peace building objectives through cooperation around shared goals and interests.

The guidance below is drawn from a number of sources, including Vivekananda, J."Practice Note: Conflict-sensitive Responses to Climate Change in South Asia", (2011) IfP-EW Cluster: Climate Change Cluster [Link], and a related blog on the International Alert website (Bessiere, C. "Towards a Climate Resilient State", (2012) Link, and the GSDRC Adaptation in fragile and conflict affected states (link). Other key documents include a GSDRC Helpdesk Research Report on conflict and climate change adaptation (http://www.gsdrc.org/docs/open/HD550.pdf) and the IISD Environment, Conflict and Peace building unit (http://www.iisd.org/ecp/).

1. Adopting a conflict-sensitive approach

Climate change adaptation policies need to be conflict-sensitive in order to minimise the negative effect they could have on security and social order and optimise instead their potential to promote socio-economic development, better governance, peace and stability.
Adopting a conflict-sensitive approach involves understanding the security, operational and social context and being aware of the impacts the interventions will have on this context. To do so, climate-related programmes should be people-oriented, take power distribution and social order into account, and avoid putting groups against each other. This requires carrying out inclusive and participatory analysis of the actors, context causes and dynamics before any intervention.

2. Promoting resilience and adaptability instead of adaptation as a set of techniques

To go further than the "do no harm" approach, conflict-sensitive adaptation also aims at improving the context in order to build the foundations for lasting peace. Doing so requires promoting a "resilience-protection-response model" that would take all the aspects of vulnerability into account instead of seeing climate change adaptation as a technical exercise. Yet, the main responses to climate changes issues have been technical solutions while the impacts of the environment degradation on the political and social systems remain often unaddressed.
Shaping relevant adaptation policies would involve going beyond the direct biophysical consequences to link them to their impact on the political and social realities. It would require focusing on the linkages between development, peace and climate resilience in order to address the multi-dimensional aspects of vulnerability.
An individual's ability to cope with shocks is determined by a set of linked factors which limit or multiply their options, and it is crucial for governments to consider a sustainable livelihoods approach in planning for resilience to climate induced shocks – looking at all types of assets, not just environmental ones.

3. Confronting interlinked problems with a cross-sectoral approach instead of compartmentalising and sequencing

Contributing to creating a “resilience-protection-response model” involves acting in a cross-sectoral way to contribute to build better governance institutions and to reinforce the relationship between the citizens and the state.

This requires another shift in the policy-making at the international level. Instead of compartmentalizing and sequencing policy areas, which is not efficient and lead to an issue of conflicting priorities, donor countries should accept the complexity and confront interlinked problems. The solutions to do so need to be flexible and cross-sectoral. For example, gender and climate change questions have to be addressed together, with governance institutions as the cornerstone of the approach. Given that women and men do not socially have equal access to environmental resources, climate change affects them differently. Efficiently promoting a “resilience-protection-model” would involve narrowing the differential vulnerability between social groups, which is linked to the institutions’ ability to level social inequalities.

Moving towards a climate resilient state goes beyond the environmental issue itself. It involves adopting a conflict-sensitive approach not only to prevent climate change adaptation policies from “doing harm” but also to re-shape the context in order to decrease vulnerability levels by consolidating governance institutions. Rethinking peace building, emergency and development policies in the light of this comprehensive approach requires deep evolutions from policymakers and NGOs and a better coordination between the various stakeholders.

International donors can take the lead of this shift, by making their funding mechanisms more flexible, promoting research and analysis before interventions, and addressing the various cross-cutting areas of peace building and development in a comprehensive way instead of compartmentalising and dividing their funds between what they see as conflicting priorities. It also involves shifting from a short-term perspective to a long-term one and better addressing people’s needs while taking extremely care of improving national state systems capacities instead of bypassing them.

Table 8

Country	Organisation	Climate Issues	Technology Solution	Technology Challenges	Source
Lesotho	Lesotho Meteorological Service (LMS)	Farming on marginal land – steep, eroded, infertile.	**Seasonal climate forecasts** produced and disseminated nationally, predicting rainfall expected in wet-seasons. Farmers use information to: invest in fertiliser if a good year is expected; inform crop selection; management of water resources; allocation of agri & household incomes; amend planting and investment activities.	Accuracy of rainfall predictions can vary due to high climate variability of mountainous terrain. Information is in English, not Sesotho. Late dissemination of forecasts leaves little time for farmers to make decisions. Meagre resources of LMS leads to poor use of dissemination channels (print, radio) – issued via press release and expected to 'filter down' through government tiers, but ineffective due to weak coordination between state institutions and central government. Extension agents not trained to communicate with farmers effectively. No follow-up support provided to farmers.	"Technologies for Climate Change Adaptation", UNEP Riso Centre, GEF, Practical Action, 2011 Link
Zimbabwe		Drought, poor soil fertility,	**Traditional forecasting** by rural Shona community members who capture information on trees, birds and animal behaviour as signals of changes in the quality of their environment. Trees as soil fertility indicators, birds as heralds of rainy season, trees as water level indicators, abundance of wild fruits to indicate a quality rainy season. Could link in with community meteorological observers, keeping daily records of bio-indicators and climate variables captured by basic weather stations installed on their farms. Information is screened, handed over to system operators for processing and validation, weather forecasts are produced and disseminated and guidance and advice provided to the local community in the native language.	Depends on peace and relative stability in the rural area to enable people to travel outside their housing settlement in order to observe natural indicators, as well as flora and fauna remaining undisturbed by conflict, illegal logging etc. Limitations of providing validated data include the scale of application since it usually applies to the very local level. High costs of establishing ($50,000) and running ($25,000 per year) such a climate monitoring system. Increased climate variability in certain contexts can throw into question the validity of biological indicators.	IDRC Research, quoted in: "Technologies for Climate Change Adaptation", UNEP Riso Centre, GEF, Practical Action, 2011 Link
Nigeria,	ICRC	Climate change	**Early Warning/Early**	Lack of trainers and disseminated	http://www.ifrc.org/

Country	Organisation	Climate Issues	Technology Solution	Technology Challenges	Source
Niger		induced shocks - Flooding, drought	**Action Framework**. Disseminating appropriate information to communities using low-cost communication networks (radio, SMS). Identifying the communities at risk and building dialogue with communities' leadership structure; training local volunteer committees in translating meteorological information to communities into intelligible messages; linking early warning to action through contingency planning	information to volunteers has caused a delay. The tailored bulletin for the Federation needs to be translated into a format that is more user friendly especially to the communities at risk and the National Societies. Still a need for more localized contingency planning for rural areas where crops and other livelihood means are at risk. The low rate of funding response is making it difficult to conduct rapid response. Difficult to access remote and distant communities. Due to armed conflict in the Northern part of Niger, monitoring and evaluation component still remain a major challenge. Slow flow of information at National Society level, creating confusion and has slightly delayed implementation of some planned activities	docs/appeals/10/MDR61005du2.pdf
Nepal	Local Government	Depletion of ground water levels affecting rural communities	Installation of **community water tap** using one-off local government cash-handout to pump groundwater.	Community members were **ill-informed** about depleting groundwater levels, and that uncontrolled surface water extraction would hasten water depletion. The tap ran dry, and resulted in the community losing faith in local government.	"Technologies for Climate Change Adaptation", UNEP Riso Centre, GEF, Practical Action, 2011 Link
Zimbabwe	Hama Mavhaire	Dry agro-ecological zone	**Sprinkler irrigation system** – drag hose sprinkler irrigation system. Involved participation of local farmers in feasibility study, planning, design and construction. (96 hectare system, apportioned equally amongst 96 farmers, inc. 70 women)	Lack of access to finance to purchase equipment, lack of local skills for design, installation and maintenance of the system (a particular problem in fragile states where 'brain drain' is common), lack of locally or nationally available component parts. Low levels of public awareness or concern over the importance of sustainable water management and use. This also requires a suitable fresh water source in close proximity, which could possibly fuel conflict over resources.	"Technologies for Climate Change Adaptation", UNEP Riso Centre, GEF, Practical Action, 2011 Link
Zimbabwe	UNDP	Drought and	**Crop diversification** to a mix of	Requires effective local and national	Adaptation

Country	Organisation	Climate Issues	Technology Solution	Technology Challenges	Source
		agriculture losses	more than 4 crops (sorghum, pearl millet, maize, groundnuts, cowpeas, and cassava) through farmer field schools. This involves exchange visits for neighbouring farmers, public awareness campaigns, tours by policy makers. (Chiredzi district)	government leadership as well as institutional and level frameworks in order to coordinate and guide adaptation. This depends on resources and human capacity. Bottom up; participatory processes are crucial to ensure ownership and appropriateness to context. Monitoring and evaluation needs to be a priority, which involves taking into account a climate baseline – requires a control group.	Learning Mechanism http://www.adaptationlearning.net/projects/zimbabwe-coping-drought-and-climate-change
Afghanistan	FAO	Poor storage of cereals leading to post-harvest losses	**Improved grain storage silos and warehouses** through capacity building of tinsmiths, blacksmiths and craftsmen, and local procurement of construction.		"Technologies for Climate Change Adaptation", UNEP Riso Centre, GEF, Practical Action, 2011 Link