Report on Samoa's Current Situation and the Needs on Technology Transfer

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The objective of this paper is to clarify the information on the current situation, needs and concerns of Samoa on Technology Transfer.

Samoa is a small South Pacific Island nation comprises by two islands, Upolu and Savaii. Its total land area is 2,934 $km^{2\ and}$ has an exclusive economic zone (EEZ) of 12,000 km^2. (fig.1.)The main topographical features of Samoa are rugged mountains of the volcanic origin, surrounded by flat and rolling coastal plains. Samoa's climate is typical small tropical islands, geographically isolated from big landmasses. The rainfall and humidity are usually high.

The indigenous population is Polynesian with the population of 161,298 people whom 34,000 live in Apia. (Census Dept Statistic (DOS) 1991). Population estimated for 1994, 1995, 1996, 1997 and 1998 are 163729, 164548, 165371, 166694 and 168027 respectively.

The government of Samoa officially became part of the United Nations Framework Convention on 29 November 1994. It was then, plans and policies were discussed as well as activities to develop information about climate change issues and the objective of the UNFCCC. The need of fulfilling the ultimate objective of the UNFCCC Samoa worked on their National Communication as part of its obligation and commitment. This was the most effective way of fulfilling its objective which is to reduce the atmospheric concentrations of GHG to stable level within a specific timeframe to ensure no adverse human induce interference with the climate system.

The GHG Inventory

Samoa's decision to become a party to the UNFCCC - activity is both wise and timely, and compiling a GHG inventory is an essential activity for Samoa. An understanding of

the GHG sources and sinks is as vital as knowing the magnitude of GHG emissions and removals.

The emissions of GHG in Samoa are relatively insignificant by world standard. Notwithstanding, Samoa is among the most vulnerable countries to the impacts of the greenhouse effect. It is ethical, therefore, that Samoa should recognize its obligation toward reducing GHG emissions.

Levels of Confidence

According to the IPCC Guidelines, countries need to identify the levels of confidence in their inventories (IPCC Revised 1996). The Samoan GHG Inventory adopts three different levels of confidence summarized in Table 2.2 below. It must be pointed out that the definition of the levels is conceptual. This simply means that the levels of confidence were not derived from a statistical analytical procedure, but were based purely on a professional judgement of the task force that compiled the inventories. It is for this reason that uncertainties are not assigned to activity data during the computation phases. They are only assigned to the outcome of the emissions and removals.

Level of confidence	Code number	Energy, Industry	Agriculture, Land Use, Waste, Industry
High	1	Uncertainty <10%	Uncertainty<30%
Medium	2	Uncertainty<10-50%	Uncertainty 30-80%
Low	3	Uncertainty>50%	Uncertainty>80%

Easy access to an accurate GHG database is as vital factor required for a better understanding of the estimated contribution to enhancing GHG pollutants but more importantly to give guidance in social and economic development planning.

Agriculture

Generally, the GHG Inventory data from the Agriculture category is scarce and out of data Some estimates used in this inventory were based on a study undertaken 10 years

ago (GWS 1990). Ironically, the majority of the Samoan populations rely heavily on agriculture to meet their everyday needs (Fairbairn 1985, 1991, 1993; Saifaleupolu 1996). Despite the strong emphasis placed by the MAFFM in collecting agriculture-based data, rural agriculture is still poorly understood (Fairbairn 1985). Hence, an issue requires immediate addressing. Samoan agriculture involves shifting cultivation that employs a fallow system. This feature is recognized in this inventory under the Land Use Change and Forestry category in the Land Abandonment sector. Most of the lands used for the talo industry have been put to fallow since the incidence of the talo leaf plight in 1993. A large portion of these lands is found in the wet and moist areas a fair distance from the farmers residence.

Most crop residues are non-combustible. These are usually left to decompose at the plantation sites. The lack of quantitative data about these items, however, excluded them from the inventory. The only residues that are good fuels are the coconut husks and shells. These have been used as part of the inventory under the Field Burning of Agricultural Residues sector.

It is important; however, to point out that these residues are very rarely burned in the field because they form a significant part of Samoa's biomass fuel. Nonetheless, their inclusion is important because it gives a more true indication of the emissions of GHG from the Agriculture category. It is also interesting to note that the Agriculture category emitted only CH_4 and N_2O- no CO_2

Mitigation

Samoa as a non- – Annex I party has already taken steps towards implementing the objectives of the UNFCCC. The government, through its NCCCT, in close collaboration with the DEC, MAFFM, MFA, MOT, TD, SWA, NGOs, private business and the communities, has completed, the GHG Inventory and the V & A statement.
The GHG Inventory, which was completed in February 1999, has indicated several salient issues that require urgent addressing. It is vital to acknowledge that the approach used to address these issues must clearly identify a vision that it forms a fundamental

component of an integral national effort to adapt to and to mitigate CC adverse impacts. It is also important at this stage to point out that the methodology adopted by Samoa when undertaking its GHG Inventory is that provided by the IPCC. Since this is the first inventory of its kind, it is important to acknowledge that the primary problem encountered in the GHG Inventory was the difficulty associated with baseline data. Underlying this problem are the basic constraints due to the following

- the data, in general, are incomplete and incomprehensible,
- management of data is generally poor, and is further aggravated by the lack of physical management resources, and
- The scarcity of the data management skills and capabilities.

Therefore, establishing a reference point for baseline, although constrained by the above factors, is clearly identified as a real and urgent problem in Samoa and was promptly dealt during the inventory compilation phase.

Vulnerability and Adaptation

Samoa's GHG Inventory indicates that its GHG emissions are relatively very small. This, however, does not imply that it will not be adversely affected by the impact of CC. The devastation inflicted by tropical cyclones Ofa and Val as pointed out previously is a reminder of the high degree of Samoa's vulnerability to the impacts of CC. Samoa, as a result, needs to take prompt and proper actions, to ensure everyone understands that the adverse consequence of CC has the potential to endanger human life and imposes a threat to the biophysical environment, that communities livelihood is derived from.

There is compelling evidence that CC not only threatens the biophysical environment but it also increases potential vulnerabilities of the people and the socio-economic structures and activities.

An important aspect of the National Communication for Samoa is to identify both the vulnerability of Samoa to the adverse effects of CC and the possible adaptation options. Samoa's V&A adopted the IPCC Technical Guidelines to examine present conditions and

to generate scenarios of possible CC and SLR in Samoa. These scenarios were used to project the vulnerability of Samoa to CC and SLR.

The main limitations of Samoa's V&A statement are the existence of many information gaps, and the lack of necessary resources. Collected data indicated several gaps and there is a parallel lack of appropriate models required to produce suitable scenarios for Samoa. This V&A statement is based on Samoa's known and predicted vulnerabilities to CC. The National Communication under the UNFCCC indicates the environmental issues which Samoa have studied for awareness on CC effects

- population and food security
- urbanisation and water resources
- land use, deforestation and land degradation
- coastal and marine resources
- climate and health

It also briefs on the V & A statement and the exposure units. Samoa has a wide and diversity compared to other small islands, but it biophysical and socio-economic system are very sensitive to current changes in ocean and atmospheric conditions. Five focus areas are examined in this study, and these include Coastal environment, health, water, Agriculture and Bio-diversity. They have been specifically selected, because of their high priority and high sensitivity to CC and besides, they are all interrelated and interdependent

- coastal environment and systems
- human health
- water sector
- agricultural activities
- Biodiversity

To gain better understanding of the implications of CC and SLR to Samoa's biophysical environment is constrained largely by the lack quantitative data and limited analytical studies already undertaken have enabled some far capability. However, the few studies already undertaken have enabled some far judgements and assessment of what may be expected from the effects of climate change and sea level rise.

The least cost options (economic, social and environmental) for adaptation to CC are those related to activities that are either on going or likely to be easily implemented with local resources. The highest cost options, on the other hand, are those that would be identified as no regrets strategies (e.g. sea walls) and are related to the most severe effects, and the greatest vulnerabilities.

Samoans were highly adapted to their biophysical environment. This may be reflected from their customs (faa-samoa) and their traditional houses (fale). There has been considerable change, however, due to westernisation as well as the variableness of the climate to which Samoan's are still adapting.

Despite the effectiveness of the no-regrets strategies, they are difficult to implement throughout Samoa because they can be expensive. However, with proper planning and good timing these strategies can be realized within a set time frame. In the case of a coastal area mitigation area strategy, for example a high and a robust seawall using a ""best guess" scenario of a 49cm sea level rise, a time frame or about 100 years is required to complete the whole operation. In this particular case, intermediate steps may involve relocation of people into higher land avoid inundation from storm surges. A simultaneous mitigation strategy work on the seawall must parallel the inland migration to ensure inundation and beach erosion is combated.

What Samoa needs in respect of technology transfer.

1.1 Capacity Building

We see capacity building as a vital and important process in our adaptation to climate change. In Samoa there is a critical need for continual development and strengthening of our appropriate institutions and human resources in order to provide an effective core of

scientific expertise. While data collection in preparing the inventory was in effect the most difficult phase, nevertheless it highlighted the inadequacies in data management that must be improved to ensure better data quality in the future. The assistance of academics in the preparation of the National Communication highlighted also the advantages in strengthening our educational institutions including enabling them also to collect, analysis and store data and information. Priorities need to allow Samoa to plan and to implement appropriate and effective responses to climate and sea level changes has been identified and are summarized below:

1.2 Technology Transfer

There is still need on technology transfer for the government of Samoa due to high cost and the certainty of permission, capacity and tariff. There will also be a need for experts to operate such technology and to give directions or guidelines on how to use or apply the technology to the need.

- Improve predictions of extreme events to assure preparedness, thus reducing impacts
- Better understanding of impacts of CC on agriculture (crops, livestock, forests, cultivars and breeds) adapted to such change, and interactions with invasive/ alien species,
- Enhance understanding of coral reef ecosystem, coastal erosion processes and land at risk from flooding and inundation. This requires an integrated approach encompassing ongoing researches, monitoring capacity building, training developing local expertise, strengthening institutional capacity and improving integration of traditional and modern knowledge.
- Improve understanding of impacts extreme events on infrastructure, human health, and agriculture –how the impacts change with shifts in frequency and intensity.

1.1 Develop a national policy framework to facilitate implementation of appropriate and effective adaptation strategies and mitigation measures; such includes transfer of technology (environmental) that reduce GHG emissions.

2.1 Incorporate institutional strengthening, community participation, and develop national capacity and expertise locally and regionally.

- Improve regional information on future climate and sea-level change and cumulative and indirect effects of such changes. This will include developing locally appropriate methodologies for analyzing these effects and increasing understanding of current interactions of climate, sea-level variation and environmental and socio-economic effects and changes.(E.g.) Transfer of technology from developed countries to developing ensuring that the technology is applicable and can be serviced by local expertise.

Summary

Conclusion

In conclusion, the completion of the GHG Inventory and the Vulnerability and Adaptation Assessment as a significant step for us in implementing the UNFCCC. These two studies provide the foundation for developing suitable and practical mitigation and adaptation strategies.

Technology is one of the issues commonly raised during the GHG Inventory exercise. As raised earlier, data quality, quantity, and their management are all major constraining factors, already identifies by the Government of Samoa in the implementation of the UNFCCC. An indispensable part of the problem arises from the lack of technical equipment that has the capacity and the capability to improve data storage and easy management. This issue has been raised in the GHG Inventory and is addressed again in this National Communication because future UNFCCC-related projects depend largely on the availability of quality data and efficient data management.

Further, Samoa like most least-developed countries, are still relying upon outdated technologies which are already obsolete in most parts of the world. This is very apparent in the energy and transport sectors. For example, the diesel generators used by the Electrical Power Corporation are old and very low in efficiency. In addition, office and household equipment like refrigerators and air-conditioners require either proper retrofitting with non-ODS, or total replacement.

The Kyoto Protocol under the Article 12 also provides for the Clean Development Mechanism (CDM) which could be employed by the least developed countries like Samoa to accommodate the transfer of the necessary technology through a voluntary partnership with Annex I country. Although the procedures involved are not yet finalized, CDM can be useful tool for technology transfer, which may eventually achieve some of Samoa's needs to adapting to CC and SLR

In the transport sector, many motor vehicles, both government-and privately-owned, are not operating at maximum efficiency. The old vehicles have not been properly retrofitted to take the newly introduced unleaded petrol (the only petrol available in Samoa now); hence, efficiency is expected to be very low.

Recommendations

A reliable database of good quality is urgently needed by Samoa's planners and policy-makers. Quality data is an indispensable ingredient for imaginative and prudent strategic planning and policy-making. In the fight against the current and the projected CC and SLR, Samoa must possess an adequate database of good quality.

For the above and the needs in other sectors, it is necessary to transfer proven, environment-friendly, and culturally acceptable technology into Samoa. Article 4.5 of the UNFCCC provides for this necessity. Two very vital aspects should never be overlooked during the transfer of technology into the country.

1. Modify the technology to suit the local needs – environmental, socio-economic and cultural – since only through this process can any technology be applied with more effectiveness.
2. The recipients of the technology need to be made aware and to be able to appreciate the technology. This requires raising awareness through education and training of communities about the benefit and the relevance of the technology to improving their lives.

Technology transfer in the past always neglected these two aspects and thus, most never produced the desired effects despite their good intentions.

A priority list is provided, of areas where the UNFCCC can provide assistance with respect to technology transfer.

- Energy – research into renewable energy sources including solar, wind, wave, biomass and hydro.
- Energy conservation – awareness and education programs targeting conservation energy – use behavior.
- Energy replacement
    1. research into the potential of coconut oil to replace diesel oil,
    2. Research into the potential of methanol from biomass to replace gasoline.
- Refrigeration – conduct workshops on proper retrofitting procedures and recovering of CFC, and increasing appliance efficiency.
- SLR – need technology necessary for adaptation and mitigation including suitable models to provide accurate projections.
- Data management and processing – requires both training human resource and upgrading physical facilities

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References

Andrea Williams 1999, **Report of the Delegation to the Climate Change**

Government of Samoa 1999, **First Communication Under The Framework Convention On Climate Change.**