



SAMOA

HOT SPOTS ANALYSIS &  
DEMONSTRATION CONCEPT  
(IWRM)

FINAL REPORT

March 2007



Prepared by  
**KEW** Consult Ltd  
Engineering & Water  
*Conserve the Region for Life...*

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## Executive Summary

The Pacific Islands Applied Geoscience Commission (SOPAC), have signed an agreement with the Global Environment Facility (GEF) in partnership with the United Nations Development Programme (UNDP) and the United Nations Environmental Programme (UNEP) to develop an innovative programme on Sustainable Integrated Water Resources Management (IWRM).

As part of that, the 'Sustainable Integrated Water Resources and Wastewater Management Project in Pacific Island Countries (PICs)' - the 'IWRM Project' was launched and Samoa is a beneficiary of that. The scope of this consultancy is part of a logical process that is designed to introduce, enhance and consolidate IWRM approaches and practices into governance structures at the national level as well as at the grassroots levels, such as in the catchments.

This report presents the findings of the Consultant engaged for this assignment. It describes the processes undertaken to achieve the expected outputs and discusses some issues related to IWRM and implications for implementing the full pilot project in Samoa. The close support, assistance and cooperation of all key stakeholders, in particular the National IWRM Focal Point, Mr Suluimalo Amataga Penaia, Assistant CEO of the MNREM and his Water Resources Division staff, made it possible to complete the HSA process and reach a consensus on the Demonstration Project in a timely manner.

The key outcomes of the given consultancy tasks are as follows:

1. From two consultation workshops held on 28 February and 6 March 2007, the national stakeholders agreed on 6 critical and sensitive areas in Samoa. The Hot Spot areas selected were (1) Apia Catchment (2) Coastal Management (Apia) and (3) Tafa'igata Aquifer; the Sensitive Areas were identified as (1) Faleolo Aquifer (2) Togitogiga Catchment and (3) Irrigation and Rainwater Harvesting – Tanumalala and Aleisa districts. The HSA results and Identity sheets for each critical/sensitive area are attached in Appendix D
2. The National stakeholders reached a consensus after indepth analysis on the Apia Catchment zone as the Demonstrated Project. A Demonstrated Project Concept has been developed and forwarded to SOPAC for comments before finalisation. The DPC is attached in Appendix E
3. The collection, synthesis, documentation of information relevant for assisting Samoa in assessing likely co-funding obligations was effected with a few difficulties given their sporadic nature, meaning that extra effort was required to obtain them. Details of current relevant projects in Samoa with potential overlaps with the GEF IWRM project are tabulated in Appendix F

In approaching the next phase of this IWRM project, it is envisaged that more definite details and commitment will be obtained for co-funding sources.

## **Acknowledgements**

The Consultant wishes to acknowledge the support and participation of the Management and staff of MNRE, SWA, MAF, EPC, MWCSD, MoH, STA, MESC, MoF and WaSSP Management Unit in completing the assigned tasks for the period allotted (20 February – 31 March 2007). On top of their busy workloads, the stakeholders, and in particular Mr Suluimalo Amataga Penaia and his senior staff members, Ms Frances Brown and Ms Larissa Toelupe, contributed immensely to bringing about the expectant results for Samoa's case. The Consultant merely adhered to its TOR, which was to assist the process.

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## Acronyms

ACEO	Assistant Chief Executive Officer
ADB	Asian Development Bank
CEO	Chief Executive Officer
DP	Demonstration Project
DPC	Demonstration Project Concept
EPC	Electric Power Corporation
EU	European Union
GOS	Government of Samoa
HS	Hot Spot
MAF	Ministry of Agriculture and Fisheries
MESC	Ministry of Education, Sports and Culture
MNRE	Ministry of Natural Resources, Environment and Meteorology
MOH	Ministry of Health
MWCSD	Ministry of Women, Community and Social Development
SA	Sensitive Area
SSDP	Samoa Sanitation and Drainage Project
STA	Samoa Tourism Authority
SUNGO	Samoa Umbrella of Non-Government Organisation
SWA	Samoa Water Authority
WaSSP	Water Sector Support Programme
WRD	Water Resources Division
WSSC	Water Sector Steering Committee

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# 1 INTRODUCTION

The move to adopt a more sustainable approach to water development and management in the Pacific Islands is encouraging. Traditionally, the concept and approaches of IWRM were being practised in the local contexts of respective PICs for centuries. However, it was not until recently that the emphasis has shifted to implementing the IWRM approach in governance structures at national and localised levels (e.g catchments). The time for change is NOW - there is a critical need to promote and take up a coordinated and holistic approach to water resources management and water use in the PICs and existing plans and initiatives such as the Pacific Regional Action Plan on Sustainable Water Management (Pacific RAP) and Pacific Partnership Initiative on Sustainable Water Management are in place to pursue that further.

The current Hot Spot Analysis/Demonstration Concept project, for which this report is prepared, is part of the broader "Sustainable Integrated Water Resources and Wastewater Management Project in Pacific Island Countries (PICs)" funded by SOPAC and GEF, in partnership with the United Nations Development Programme (UNDP) and the United Nations Environmental Programme (UNEP)

This report will outline and discuss the processes and activities undertaken by the Consultant in Samoa in accordance with the project scope. It also provides some analysis of the findings and present recommendations to SOPAC based on consensus of key stakeholders.

## 1.1 Objectives and Scope of Assignment

The Consultant, KEW Consult Ltd, commenced assignment as per agreement with SOPAC, on 20 February 2007. The following tasks were assigned for completion by 31 March 2007.

1. Assist Samoa in organising and possibly facilitating a Hotspots Analysis consultation jointly with the project focal points and the established Inter-Sectoral Water/Wastewater Committee to identify and prioritise hotspots as a potential intervention area for the GEF funded demonstration project
2. Collect, synthesize and document relevant information to enable countries to assess likely co-funding obligations to support the GEF project.
3. Assist Samoa in designing the Demonstration Concept in the identified intervention area
4. Develop and provide a Consultants Report as specified in Article 1.5 as the Final Report, which includes a summary and major outcomes of the activities carried out, as outlined from points 1-3

(A work programme is attached as Appendix A).

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## 2 Methodology

The process and approach that was adopted in the collation, compilation and analysis of data and information and in reporting results were consultative and collaborative.

### 2.1 Collaboration with Focal Point and relevant key organizations of the Water Sector

Starting on 20 February 2007, the Consultant worked in close collaboration with the National IWRM Focal Point from the Ministry of Natural Resources, Environment and Meteorology, Mr Suluimalo Amataga Penaia. At the outset, the team planned its work approach and programme for the duration of the assignment. Key stakeholders were identified, contacted and interviewed by the Consultant within a one week period. They included Chief Executive Officers, Assistant Chief Executive Officers and Managers of the various key agencies within the water sector. The key agencies included MNREM, SWA, EPC, MAFF, STA, MOF (WaSSP), MOH, MWCSO, MESC and SUNGO.

The objective of the interviews was to establish a preliminary relationship with the key stakeholders prior to the scheduled consultation workshops in the ensuing weeks. This was effected by the Consultant explaining the aims of the assignment, gauging the respective level of awareness of IWRM principles amongst those interviewed, obtaining their perspectives of what areas may constitute HS or SA in Samoa and discussing possible constraints to effective IWRM processes. The people interviewed were also asked about existing and planned projects that may duplicate or complement the efforts of the IWRM project.

A matrix of responses and comments derived from the interviews was compiled (attached as Appendix B). This was then discussed and analysed by the Consultant and Mr Penaia, from which options for HS and SA were considered for presentation to the first Consultation workshop on 28 February 2007.

#### 2.1.1 Consultation Workshops

Two consultative workshops were conducted with key stakeholders on 28 February and 6 March 2007 respectively. They were both facilitated by the National IWRM Focal Point. The first workshop was officially opened by the Managing Director of the Samoa Water Authority and his speech was oriented towards the importance of working together in an integrated manner to achieve the national water goals. Further to this and in reinforcing the IWRM message, a special presentation was made by the Programme Management Unit of the EU funded Water Sector Support Programme (WaSSP) which also helped to enable the participants to gain a better appreciation of the importance of the IWRM process, not only nationally but regionally. The aims of the initial consultation were to provide an overview of the IWRM project, explain the objectives of the current HS/SA consultancy, discuss the results of interview findings, present the initial options for HS and SA in Samoa for further exploration and analysis by the wider group, and then gain final consensus on three HS and SA from which one would be selected to develop a national demonstration project concept. An evaluation/ranking exercise was conducted however owing to a time constraint, the total results were not known and were to be made available at the next workshop.

A smaller working group comprising the Focal Point, the Consultant and representatives of MNREM, SWA and MAFF were subsequently formed to meet and finalise details of the HS and SA agreed upon by the wider stakeholders. The representative of SWA was unavailable. The composition of this group was based on the HS and SA chosen, i.e their organizations were the implementing agencies for the prioritised HS and SA. The ranking results calculated by the Consultant were presented to this group and the highest ranked HS was agreed upon but not finalized until the stakeholders were to meet again at the 2<sup>nd</sup> workshop. The draft identity sheets for each HS and SA were also discussed and completed for finalization at the last workshop.

The workshop held on 6 March 2007, although not in full attendance like the first one, was nevertheless very interactive and gained consensus on the prioritized HS area – the Apia Catchment. Details for putting together the demonstration project concept paper were easily gathered by the workshop participants.



**Figure 1** Participants at Workshop on 28 February 2007

### **2.1.2 Collation of literature and project material**

Relevant documentation were collected from stakeholders and via research, comprising current and past water sector project reports, catchment and coastal management/action plans (draft and final), draft and existing legislation and policies and media reports. It was encouraging to discover that there is a wealth of literature/information relevant to this project. Its spread over different agencies in Samoa and maintaining their quality for ongoing reference and use suggests however that some form of central data/information storage or management may be required in the future.

(A list of documents collected and used is attached as references in Appendix C)



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## 3 Findings/Results

### 3.1 Determination of Hot Spot/Sensitive Areas

The individual consultations with various key stakeholder agencies proved to be a positive platform from which to gain valid information to use for the Hot Spot analysis exercise. It was evident from discussions across the board that each person interviewed from the respective organisations already had clear positions of what they considered to be a hot spot/sensitive area requiring attention. The wide ranging issues are reflected in the Summary Table of Issues in Appendix B. It was also apparent that there was a general lack of awareness and appreciation of IWRM principles. Many issues raised appeared to be more sector specific rather than that encompassing a sector wide perspective. This sort of attitude however is expected to change with increasing involvement and understanding of the IWRM process.

Amongst the gamut of issues raised, careful analysis and detailed discussion of them resulted in 6 major issues being prioritized for exploration as potential HS and SA at the workshop. They were Vaisigano catchment area, coastal management in Apia, lack of coordination and data exchange within the water sector, the Faleolo aquifer, Togitogiga catchment and inadequate awareness of land and water issues. Given that this initial list was intended to serve merely as starting pointers to generate indepth and focused discussion at the first workshop, it was expected then that some of the issues would be challenged and changes made to the initial list.

With a good mix of inter-sectoral participants at the workshop, ranging from CEOs to senior ranked officers from MNREM, SWA, EPC, MWCSO, MoF, MAF, MoH and MESC, open debate and information flowed. Key concerns raised earlier during the individual interviews were echoed at this forum. In particular, the problem of poor coordination of efforts, resources and data/information within the water sector was highlighted as one that was rather critical as it affected all the agencies and impacted significantly on the utilization of resources. However, as it was identified as an area being addressed under the WaSSP, it was considered best to leave aside so that the funds available for this project were targeted specifically where most needed.

The deliberation and analysis of issues took longer than the actual ranking exercise which followed. A determining factor in the selection process was the concept of replicability of the chosen project to other areas in Samoa or within the Pacific region.

In discussing which issues Samoa should best direct its attention for intervention under this project, water supply – although very important was considered a lesser priority. This was the general perception of the workshop participants following the WaSSP Management Unit's presentation, demonstrating that regionally, more emphasis was being placed on IWRM and improving water resources management. Over the last decade or so, Samoa has been receiving considerable attention and assistance in improving and rehabilitating its water supply and infrastructure. However, In line with the aims of IWRM, it was emphasized at the workshop that the focus should be on the need to ensure Samoa's water resources are effectively and sustainably developed and managed. In other words, without adequate water resources, there would not be adequate water supply for the country.

Other concerns were discussed in relation to water supply issues, particularly wastewater and sanitation. Notably, these are currently the major focus of an ADB project for improving

drainage and wastewater management in urban Apia. Notwithstanding the lengthy discussions over the various issues, it was essential and vital for facilitating a better sense of ownership amongst the participants of the IWRM process and recognizing the benefits gained for all the various sectors such as electricity, tourism, agriculture and fisheries etc

Consensus was reached subsequently on the following 3 respective areas identified as Hot Spots and Sensitive Areas.

*Hot Spots:*

1. Apia Catchment (covering sub-catchments of Vaisigano and Fuluasou)
2. Coastal Management (Apia)
3. Rainwater Harvesting in Aleisa and Tanumalala

*Sensitive Areas:*

1. Faleolo Aquifer
2. Togitogiga Catchment
3. Tafa'igata Aquifer

The ranking exercise that followed was conducted in the open forum, although the initial plan was to break up into smaller working groups. This decision was unanimous amongst the participants given the climax attained following the discussions/analysis session. The results were later calculated by a smaller working group mentioned in the previous section and modified slightly to ensure that the nature of the identified HS/SA were consistent with the provided GEF guidelines and criteria. In order of rank, Figure 1 illustrates the confirmed results. Appendix D contains the scores matrix and individual identity sheets for all 6 areas.

Selected Hot Spots			
	Title	Score	Priority Issue
<b>Hot Spot 1</b>	Apia Catchment	85%	Severe degradation of catchment zone - water quality and quantity, pollution (eutrophication, suspended solids)
<b>Hot Spot 2</b>	Apia Coastal Management	84%	Pollution (eutrophication, chemical), loss of ecosystems (mangroves)
<b>Hot Spot 3</b>	Tafa'igata Aquifer	73%	Reduction in stream flow or quality
Selected Sensitive Areas			
	Title	Score	Priority Issue
<b>Sensitive Area 1</b>	Faleolo Aquifer	75%	Salinisation of ground water
<b>Sensitive Area 2</b>	Togitogiga Catchment	70%	Pollution (agro-chemical)
<b>Sensitive Area 3</b>	Irrigation - Tanumalala/Aleisa	62%	Reduction in stream flow

**Figure 2 Results of Ranked Hot Spots and Sensitive Areas**

## 3.2 Samoa's Demonstration Concept

The results from the HSA workshop were presented at the workshop on 6 March 2007. The closeness of scores between the two highest Hot Spots, 85% and 84% for Apia Catchment and Coastal Management in Apia respectively, rendered it necessary to engage the participants in discussion over the two areas again.

To facilitate a decision on one of the two areas, the criteria of replicability, costs, level of degradation and efforts (funded projects or government) currently being targeted to those areas were considered. Consensus was maintained for the Apia catchment after having taken into account its merits in both the short and long terms. Issues such as the current extent of damage to the catchment and the effect on the water supply and coastal waters were also determining factors.

### 3.2.1 The Apia Catchment

The Demonstration Concept Paper is appended in Appendix E. This was the result of the collaborated efforts of all the key stakeholders. The Apia Catchment zone spans an area of 85km<sup>2</sup> and accommodates approximately 40% of Samoa's total population.

Reflected in the Draft Diagnostic Report of Samoa by Clive Carpenter and corroborated by the MNREM and other stakeholders, the two major rivers within the Apia catchment – Vaisigano and Fuluasou R, can be perceived as both a 'blessing and curse'. They serve as significant sources of public water and energy supplies on the one hand while on the other they contribute greatly to sedimentation, pollution and flood problems within the catchment. It is understood though that the actual underlying causes of those issues are entrenched in the country's water and land management (or lack of) systems, which include the lack of awareness of sustainable agricultural and other land use practices, lack of integrated coordination of relevant activities at the institutional level, ineffective water resources policies and legislation, inadequate qualified staff etc

With the adoption of good IWRM practices, these problems can be addressed and even resolved in the long-term. In the shorter term however, the focus will target more manageable and practical outcomes.

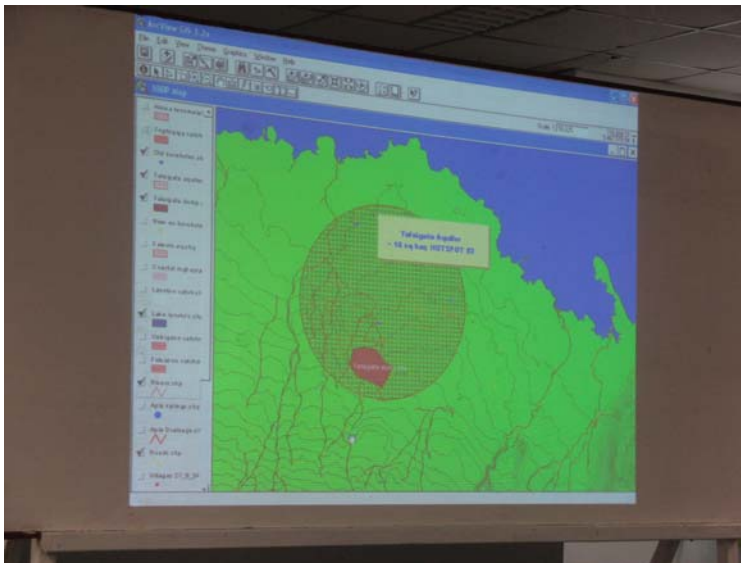
The objectives of the Proposed Demonstration Project as indicated in the DCP are to

*“rehabilitate and manage the Apia Catchment in order to improve the quality and quantity of the water resources for enhanced water supply, hydropower generation, socio-economic advancement and reduced environmental adverse impacts”.*

Its deliverable outputs include a list of activities aimed at increasing river yields through revegetation and reforestation measures, improving water quality by improving the drainage system and possible relocation of cattle farms, conserving the watershed through various techniques, including soil retention and ensuring sustainable development and management of the water resources by developing and reviewing a number of relevant plans and policies and reinforced through effective public awareness programmes.

Previous work attempted in this proposed project zone is acknowledged and where appropriate, the activities under this project will merely build on what has already been laid down. This includes the watershed management plans for Vaisigano and Fuluasou catchments which were developed in 1990. This was the subject of a project funded by the Food and Agriculture Organisation of the United Nations, Rome. Vaisigano was selected as a pilot area for the watershed management project for general application in other watersheds around the country. Implementation of the pilot was executed under the auspices of the MAFFM at the time. Work since then has continued with focus on the protection of critical areas, rehabilitation of eroded lands, drainage improvements, introduction of agroforestry and conservation practices as well as public awareness and education.

The function of watershed management is now the function of the MNREM, following the realignment of Government ministries in 2003 as a result of a comprehensive public sector reform programme. The recently formed Water Resources Division is responsible for the administration and regulation of this core activity. With the sporadic availability of relevant data and documentation (spread out amongst various agencies), the WRD is presently trying to collate such valuable material for the tasks of baseline data development and informing policy development and review. A concern expressed by the Divisional ACEO is that in order to ensure a successful outcome for this proposed project, the divisional staff will need to be upskilled and vehicles provided. The division is currently resourced with 1 vehicle which means that any efforts at implementing and monitoring activities effectively are questionable.



**Figure 3: Using GIS tools for Workshop**

need to ensure that the involvement of all relevant parties are integrated in the sustainable management of water resources so that a real sense of 'ownership' is acquired.

A similar project currently in progress since 2001 is the regional International Waters Project (IWP) which focuses on two pilot projects in the rural communities of Apolima-tai and Lepa village. The objective of the IWP is to rehabilitate degraded watershed areas in the rural context. There are undoubtedly lessons to be learned from this project in the implementation of the proposed project given the similarities in expected outcomes. One lesson to be highlighted is the crucial

### 3.2.2 Reflection of IWRM approach in the Selected Demonstration Concept

The selected Hot Spot area – Apia Catchment was examined for suitability in demonstrating the benefits of IWRM. With the concept of IWRM being relatively new in Samoa, it is difficult to assess the effectiveness of previous water resources/supply or water related projects in this context. The success of such projects would normally be measured according to the benefits gained from achieving specific outputs, without giving much heed to the impacts in the wider context.

The Apia Catchment area is considered an appropriate pilot project given its national/regional significance, relevant to its size. The issues present in this catchment impact on all inter-related sub-sectors of the water sector. They have implications for the urban water supply, public power supply, agricultural and recreational activities (eco-tourism), bio-diversity, land use planning as well as fisheries and marine eco-systems. The integrated approach in water resources management is consistent with integrated principles already being practiced in urban planning and the tourism industry.

With regards tourism, an industry that continues to grow and is the leading income earner for Samoa, its planning processes and strategic framework recognises the value of working in a mutually supportive partnership with environmental management. Hence, its advanced adoption of integrated planning for sustainable tourism development will merely enhance any efforts geared towards developing tourism interest within this catchment zone. Efforts such as further



**Figure 4: One of the main water supply sources dried up during dry season, Fuluasou river** which is one of Samoa's most popular natural heritage sites.

Essentially, in order for proper integration processes to occur, the key players need to be willing to commit to the principles of IWRM. Effective coordination and collaboration among the principal stakeholders will need to be integrated into the implementation of this proposed demonstration project, incorporating the community and village needs as well. Public awareness campaigns will require inclusive consultative processes, targeting all levels of stakeholders within the catchment zone to ensure that ownership of the project outputs as well as the process is adopted. This will guarantee a better understanding on the importance of the environment and the strain applied to Samoa's limited natural resources through people's inconsiderate actions. Effective awareness programmes can initiate collective efforts from all the stakeholders in sustainable management and utilisation of the water resources. The MESC appears supportive of any means aimed at further integrating topics such as environmental awareness into the mainstream school curriculum. The ACEO of the Policy and Planning Division indicated

that efforts have already begun to this effect in terms of reflecting sustainable environmental values into their policies.

Consistent with IWRM, the institutional mechanisms for supporting the implementation of this project are already in place. A national water sector steering committee (WSSC) has been functional since 2006 and serves as an apex-body that provides overall guidance and direction to most of the water sector projects currently in operation. Its members comprise cross-sectoral senior government officials that are driving the process so that set national goals (water related) are achieved. Under the WaSSP programme (2006 – 2010), the mechanisms for facilitating better coordination and commitment to IWRM are being strengthened at all levels of the government structures through its institutional strengthening component.

The proposed execution of the project will be guided by a Task Force, set up under the umbrella of the WSSC and comprising representatives of all the agencies with key water responsibilities or have significant interest in water, including SWA, EPC, MoH, MWCS, MAF, MoF, MWTI, STA, MESC, SUNGO and the Civil Society. In other words, the task force membership will mirror that of the WSSC but target personnel at the technical or second management levels. Gender balance will be sought in this composition. The leading agency will be MNREM. Given the focus of this Demonstration Project Concept, the task force can be referred to as the 'Catchment Coordinating Committee' and perhaps retained for a period of time, dictated by the replication of this project in other areas in Samoa. To ensure that responsible water actions and practices become like second nature to all stakeholders, participatory planning and decision-making (including community-based organisations) will need to be encouraged throughout the implementation phase.

The Consultant appreciates that in gaining support of GEF for the execution of this demonstration project, certain criteria needed to be observed. This was not difficult to achieve. The objectives of the proposed demonstration project are aligned to 4 of GEF's operational programmes and 5 strategic priorities in GEF's business plan.

## **4 Potential Co-Funding Partners**

From the various information collected and synthesized from key agencies and via research on the internet, project profiles capturing relevant details were compiled to assist Samoa in assessing likely co-funding obligations in support of this project. The profiles are attached in Appendix F. A matrix is also attached identifying the existing and planned projects in Samoa by theme.

There is a likely overlap in areas identified for remedial action under this project and those included in the EU-WaSSP programme and the ADB-SSDP. At present there is greater recognition given by the Government to the value of effective coordination between these two projects and in some instances the consolidated utilisation of resources to achieve common and integrated outcomes. It is envisaged that the same approach can be applied, where appropriate, in supporting this project.

Other possible co-funding alternatives that were discussed include the Ramsar Convention Fund, which has earmarked Lake Lanoto'o, located within the Apia Catchment, for protection given its bio-diversity significance. The ongoing Infrastructure

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Asset Management Project, administered under the MWTI may also provide assistance in terms of the drainage improvement component of the proposed demonstration project.

Policy development and review are key activities of the WRD's annual work programme and can be supported by the Government budget. Developing capacity and promoting awareness in this area of work however may require other funding support.

At this stage, it is expected that definite co-funding arrangements will be pursued upon the approval of this demonstration concept and development of the full demonstration project.

## 5 Conclusion

Samoa's level of readiness to fully engage in IWRM processes is evident in the apparent change of attitudes of key players in the cross-sectors brought about by increased awareness of the benefits of sustainable resource management. The existing policy and institutional framework further attest to Samoa's commitment to making IWRM a reality. Its water resource is finite and too precious for key stakeholders not to pay greater attention to managing it better.

The opportunity presented through the IWRM Project, for Samoa to integrate the principles of sustainable and responsible management into every level of society, starting from the top stratum of Government down to the village based plantation worker, is timely and too valuable to not take seriously.

This project will shift those stakeholders who have already resigned themselves to IWRM practices into the role of 'promoters', while encouraging the newcomers into the approach to get on board, feel their way through the process and adapt.

The process of selecting a demonstration project for Samoa from the HSA enabled all participants to appreciate the value of converging from different sectors to discuss issues pertaining to water resources management. The exercise challenged them to place aside their sectoral positions and attitudes and to consider issues from a wider perspective, including the social and economic impacts. Hence agreement on the DP was collective and informed.

The participatory approach that has been applied throughout the activities undertaken by this Consultancy has hopefully set the pattern to be continued into the next phase of this project. The positive relationship fostered between the key stakeholders is also encouraging and will assist greatly when project implementation commences, particularly when the proposed 'Catchment Coordinating Committee' is established.

In conducting this consultancy assignment, the principles of IWRM were adhered to as much as possible and criteria set by GEF for selecting a Demonstration Project were taken account of. The tasks were carried out with little difficulty. The key personnel with whom the Consultant had considerable contact were very facilitating and provided requested information (that could be located) in a timely and professional manner.

## **APPENDIX A – WORK PROGRAMME**



**APPENDIX B – MATRIX OF INDIVIDUAL RESPONSES AND LIST OF  
PERSONS CONSULTED**

<b>Agency/Division</b>	<b>Hot Spot</b>	<b>Sensitive Area</b>
<b>MNREM</b>		
Water Resources	<ul style="list-style-type: none"> <li>• Lack of awareness re IWRM amongst relevant agencies and community</li> <li>• Vaisigano catchment</li> </ul>	<ul style="list-style-type: none"> <li>• Faleolo aquifer</li> <li>• Tafaigata aquifer (rubbish site)</li> </ul>
Meteorology	<ul style="list-style-type: none"> <li>• Sand mining management</li> <li>• Mapping of coastal water spring</li> </ul>	<ul style="list-style-type: none"> <li>• Underground water – Tuana’i and Lano</li> </ul>
PUMA	<ul style="list-style-type: none"> <li>• Coastal management (Apia)</li> <li>• Lack of coordination and collaboration between agencies (e.g data sharing)</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of personnel to effectively monitor implementation of policies/strategies and guidelines</li> </ul>
Environment & Conservation	<ul style="list-style-type: none"> <li>• Lack of information exchange between water sector stakeholders</li> <li>• Financial limitation</li> <li>• Lack of awareness on water management amongst industries that are significant water users</li> </ul>	<ul style="list-style-type: none"> <li>• Impact of deforestation and developments on Lake Lanoto’o (further impact on adequate water for Apia)</li> </ul>
Land Management	<ul style="list-style-type: none"> <li>• Sand mining</li> <li>• Lack of awareness about land use issues</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of data exchange</li> <li>• Land reclamation</li> </ul>
Forestry	<ul style="list-style-type: none"> <li>• Watershed Management (Vaisigano catchment)</li> </ul>	
<b>MAF</b>		
Fisheries	<ul style="list-style-type: none"> <li>• Contamination of Palolo Deep</li> </ul>	<ul style="list-style-type: none"> <li>• Village stream contamination impacting on village nurseries e.g clam</li> <li>• Mangrove reserves</li> </ul>
CROPS	<ul style="list-style-type: none"> <li>• Rainwater harvesting</li> <li>• Lack of data sharing</li> </ul>	<ul style="list-style-type: none"> <li>• Irrigation practices</li> </ul>
Livestock	<ul style="list-style-type: none"> <li>• Togitogiga cattle farm impacting on tourism</li> </ul>	<ul style="list-style-type: none"> <li>• Sheep breeding at Tanumalala</li> <li>• Cattle farming practices</li> </ul>

	<b>Agency/Division</b>	<b>Hot Spot</b>	<b>Sensitive Area</b>
	<b>MWCSD</b>		
	Internal Affairs		<ul style="list-style-type: none"> <li>• Building up capacity in water sector</li> </ul>
	Women	Unavailable	
	<b>MOH</b>		
	Environmental Health	Unavailable	
	<b>MESC</b>	<ul style="list-style-type: none"> <li>• Integration of water management issues into curriculum</li> <li>• Inadequate water supply for schools (close early)</li> </ul>	<ul style="list-style-type: none"> <li>• Improve coordination between schools and water sector stakeholders</li> <li>• Improve awareness for teachers and committees</li> </ul>
	<b>SWA</b>	<ul style="list-style-type: none"> <li>• Alaoa Treatment plant not sufficiently effective to counter existing turbidity count from Vaisigano R</li> <li>• Fuluasou Treatment plant stretched during dry season</li> <li>• On-site sanitation for low lying area in Apia township</li> </ul>	
	<b>EPC</b>	<ul style="list-style-type: none"> <li>• Competition for water with SWA in Vaisigano catchments (Alaoa and (Fale o le Fe'e)</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring of electricity per m<sup>3</sup> of water pumped from underground</li> <li>• Lack of coordination, data exchange</li> <li>• Inadequate awareness of water issues/activities from time to time</li> </ul>
	<b>TOURISM</b>	<ul style="list-style-type: none"> <li>• Matareva-Lefaga water supply unreliable</li> <li>• Quality of Togitogiga waterfall</li> <li>• Falealupo – no water</li> </ul>	

	<b>Agency/Division</b>	<b>Hot Spot</b>	<b>Sensitive Area</b>
	<b>WS-PMU</b>	<ul style="list-style-type: none"> <li>• No water supply in Falealupo</li> <li>• Manono-Tai water pipeline supply reticulation improvement</li> </ul>	<ul style="list-style-type: none"> <li>• Impact of more hotel development on Faleolo aquifer</li> <li>• Lack of coordination and data exchange amongst water sector</li> </ul>
<b>IWRM issue/concern most commonly identified as HS/SA</b>		<ul style="list-style-type: none"> <li>• Sand mining (<b>thematic</b>)</li> <li>• Vaisigano Catchment improvement (<b>geographic</b>)</li> <li>• Lack of data sharing and coordination amongst agencies (<b>institutional</b>)</li> <li>• Lack of awareness on water and land issues (<b>socio-economic/institutional</b>)</li> <li>• Falealupo – no water (<b>geographic</b>)</li> <li>• Coastal management issue in Apia (<b>geographic</b>)</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of coordination and data exchange (<b>institutional</b>)</li> <li>• Inadequate awareness on water management issues (<b>socio-economic/institutional</b>)</li> <li>• Faleolo aquifer (<b>geographic</b>)</li> </ul>

The three Hot Spots and three Sensitive Areas determined from analysis of findings are:

**Hot Spots:**

1. Vaisigano catchment (water supply, EPC, flooding, farming, pollution, high population, land use on flood plains)
2. Coastal management (waters, erosion, pollution, sand mining etc) in Apia
3. Lack of coordination amongst water sector agencies (incl data exchange etc)

**Sensitive Areas:**

1. Faleolo aquifer (new hotel, new developments, golf course, WSTEC subdivisions, Manono-tai water supply)
2. Togitogiga catchment (cattle farming, tourism, national reserve)
3. Inadequate awareness of water and land issues

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**Persons Consulted between 20 February and 30 March 2007**

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2. Mr Mua'ausa Joseph Walter, Managing Director, Electric Power Corporation
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4. Mr Faumuina Sailimalo Pati Liu, Assistant CEO, Environment and Conservation, MNREM
5. Mr Mulipola Ausetalia Titimaea, Assistant CEO, Meteorology, MNREM
6. Mr Tagaloa Jude Kolhase, Assistant CEO, PUMA, MNREM
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8. Mr Nanai Tony Leutele, ACEO, Forestry Division, MNREM
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10. Mr Anthony Mulipola, Assistant CEO, Fisheries, MAF
11. Mr Faleupolu Tiatia, Assistant CEO, Livestock, MAF
12. Mr Luaiufi, Crops, MAF
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**Participants at Consultation Workshop, Hot Spot Analysis, 28 February 2007**

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16. Mr Ludo Prins, Programme Management Advisor, Water Sector Support Programme
17. Mr Henk Gyselhart, Team Leader of Programme Implementation Assistance – Water Sector Support Programme
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21. Ms Fiona Sapatu, Principal Strategic Planning Officer, PUMA, MNREM
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23. Mrs Veronique Provo-Aukuso, Projects Specialist, KEW Consult
24. Mr Semi Lesa, Service Engineer, KEW Consult
25. Mrs Kisa Kupa, Projects/Corporate Services Manager, KEW Consult

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14. Mrs Kisa Kupa, KEW Consult Ltd

## **APPENDIX C – REFERENCES**

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## Literature

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## **APPENDIX D – HOT SPOT ANALYSIS SCORES MATRIX**

## **APPENDIX E – DEMONSTRATION PROJECT CONCEPT PAPER**

**Country:** SAMOA

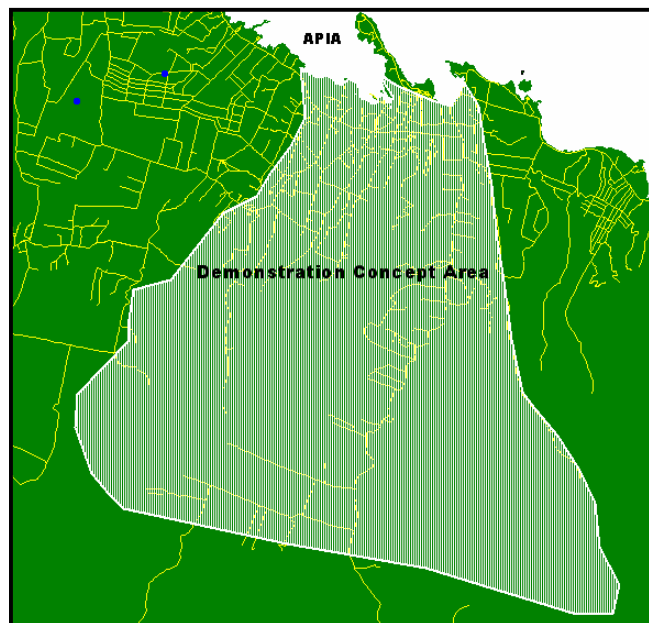
**Title:** Rehabilitation and Sustainable Management of Apia Catchment

**Project Description:**

Located on Upolu, the Apia catchment covers 85km<sup>2</sup> and includes Lake Lanoto'o and its two subcatchments, Vaisigano and Fuluasou. It is essential for the provision of water supply as well as hydropower generation to the growing urban area of Apia, the capital city of Samoa, that also concentrates most businesses and tourist infrastructures (hotels, restaurants) of Samoa; and other villages along the East coast of Samoa. This area accounts approximately 40% of the population of Samoa, which is 177,000 people according to 2001 Census.

Lake Lanoto'o, which is Samoa's second national park in terms of size, is protected under the Ramsar Convention. It is home to rare bird species including the Manu Ai Pa'u La'au (Red Headed Parrot Finch), Manumea (Tooth Billed Pigeon) and Manutagi (Crimson Crowned Fruit Dove), all endemic to Samoa, and filled with gold fish first introduced into the lake by German settlers in the late 1800s. Three natural plant formations have been identified in the area. These are upland rush and reed swamps, upland swamp forest and primary high forest.

The Vaisigano subcatchment, located in the North Central Upolu Island near the growing capital city of Apia, covers an area of 2300 hectares (23 km<sup>2</sup>) and is being tapped to meet the increasing demand of drinking water and hydropower for the capital city and the surrounding villages.



The siltation problem causing not only interruption to power generation and quality of water supply, also causes considerable environmental damage, threatening both inland and marine aquatic life.

The Fuluasou subcatchment covering 4500 hectares (45 km<sup>2</sup>) is located south west of Apia. It supplies drinking water to the North-West Upolu and a part of Apia. It features significant agricultural activities (cattle farms, taro, banana and vegetable productions) as well as residential areas. Steep slopes are cultivated, causing erosion while the use of pesticides threaten the quality of the water supply.

Continued land clearing for agriculture, cattle farming and land development for residential and

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business purposes affect water quality and quantity as well as the natural ecosystem in the Apia catchment area. Poor sanitation infrastructure in the capital city coupled with industrial and agriculture practices in the catchment area have led to fresh and coastal water pollution and soil erosion. During the rainy season (October to March), this area is also prone to flooding and experiences dirty water supply. During the dry season, unusual river low flows and water shortages occur regularly.

The objective of the project is to rehabilitate and manage the Apia catchment to improve the quality and quantity of the water resources for enhanced water supply and hydropower generation, socio-economic advancement and reduced environmental adverse impacts.

To achieve this, a rehabilitation component will look at the revegetation of degraded areas with suitable native species, encouraging farmers within the watershed catchment to adopt sustainable agriculture practices, assessing the practicality of relocating cattle farms outside the catchment area, implementing appropriate soil conservation measures to stabilize or improve landslides, gullies, road slopes and protect river banks and improving the road drainage to divert excess surface runoff at appropriate locations.

The conservation component will include the review of the 1990 watershed management plan, the implementation of a land use plan and a targeted education and awareness programme about the importance of the water catchment and sustainable practices for conservation, the review of the national water resources and water service policies for effective water conservation, allocation and provision; the development of a water safety plan for surface and groundwater and a monitoring programme including a watershed database (including land use, vegetation, hydrological and meteorological data). To generate revenue for the sustainability of the project, eco-tourism activities will be developed in the Lake Lanoto'o and "Loimata o Apaula" reserve areas. In line with the IWRM approach, the project will foster water users involvement and participation in the management and conservation of the catchment.

**Delivery:**

- Revegetation and reforestation of degraded areas
- Approval of a land use plan
- Drainage improvement
- Watershed Management Plans (Vaisigano and Fuluasou) reviewed
- National Water Resources Policy reviewed
- National Water Service Policy approved
- Watershed Conservation Policy and Plan developed
- Approval of a water safety plan for surface and underground water

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- Appropriate eco-tourism activities implemented
  - Relocation practicality of cattle farms (including fencing) assessed
  - Soil retention/conservation measures implemented
  - Soil, water and land use monitoring programme and database developed and implemented
  - Awareness and education programmes towards watershed users implemented.

**Eligibility:**

The demonstration concept is in line with the following GEF operational programmes:

OP 2: coastal, marine and freshwater ecosystems

OP 9: Integrated land and Water multiple focal area program

OP 14: program for reducing and eliminating releases of Persistent Organic Pollutants

OP 15: sustainable land management

It meets the following strategic priorities in the context of the GEF business plan:

BD-1: Catalyzing sustainability of protected area

IW-3: Undertake Innovative Demonstrations for reducing contaminants and addressing water scarcity

SLM-1: Targeted Capacity building

SLM-2: Implement innovative and indigenous sustainable land management practices

EM-1: Integrated approach to ecosystem management

\* BD – Biodiversity, IW – International waters, SLM – Sustainable Land Management, EM – Integrated approach to Ecosystem Management

**Replication:**

This approach can be replicated in Savaii Samoa with catchments experiencing similar problems and water quality and quantity being a grave issue for residents within those areas. Moreover, given Samoa's size and similarity in geographical and climate features with other small island states, it is perceived that the replicability of this type of project is practical.

**Potential Execution:**

A Task force, comprised of key stakeholders (governmental agencies and ministries, civil society, professional associations and the wider community) with key water responsibilities and interests is proposed to coordinate and monitor the project implementation. It is envisaged that the Task Force will be composed of a technical sub-committee, formed under the auspices of the National Water Sector Steering Committee and led by the National IWRM focal point (MNRE). Gender balance will be sought in this composition. Given the focus of this proposed demonstration project, the task force may be referred to as the 'Catchment Coordinating Committee' and perhaps retained for a period of time, should the project be replicated in other areas of Samoa.

Daily implementation of the project activities will be executed from relevant implementing agencies, i.e Ministry of Natural Resources and Environment (MNRE), Samoa Water Authority, Ministry of Agriculture and Fisheries, Samoa Tourism Authority, Ministry of Agriculture and Fisheries, Samoa Tourism Authority, Ministry of Works, Infrastructure and Transport and where appropriate, non-government organisations.

**Predicted Cost:**

*In US\$, (staff and equipment inclusive)*

	<u>GEF</u>	<u>Co-Funds</u>
Revegetation and reforestation of degraded area	85,000	50,000
Land use plan development	30,000	20,000
Road drainage improvement and access road upgrade	300,000	500,000
Watershed Management Plans (Vaisigano and Fulusou) review	10,000	15,000
National Water Resources Policy review		5,000
National Water Service Policy finalization		5,000
Watershed Conservation Policy and Plan development	15,000	20,000
Water safety plan for surface and underground water development	10,000	30,000
Appropriate eco-tourism activities implementation	50,000	15,000
Relocation practicality of cattle farms (including fencing) assessment	45,000	
Soil retention/conservation measures implementation	55,000	15,000
Soil, water and land use monitoring programme and database development	20,000	80,000
Awareness and education programmes towards watershed users implementation	30,000	50,000
<b><u>Total</u></b>	<b><u>650,000</u></b>	<b><u>805,000</u></b>

**Potential Co-Funding:**

EU-WaSSP, World Bank, ADB, Government of Samoa, Ramsar Convention Fund, JICA, AusAid, NZAID

## **APPENDIX F – PROJECT PROFILES FOR CO-FUNDING OBLIGATIONS**