

Participatory Three-Dimensional Modelling (P3DM) in the Pacific

Impact study on the introduction, adoption and replication of the practice



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List of Acronyms

3D	Three-Dimensional
ACP	African, Caribbean, Pacific
ARD	Agriculture and Rural development
ASAP	Adaptation for Smallholder Agriculture Programme
AusAID	Australian Agency for International Development
CANARI	Caribbean Natural Resources Institute
CBCAs	Community-Based Conservation Areas
CEO	Chief Executive Officer
CIMC	Consultative Implementation and Monitoring Council
CROP	Council of Regional Organisations in the Pacific
CTA	Technical Centre for Agricultural and Rural Cooperation
FLMMA	Fiji Locally Managed Marine Areas
GIS	Geographic Information Systems
GPS	Geographic Positioning Systems
ICCRIFS	Integration of climate change risk and resilience into forestry management in Samoa
ICCRITS	Integration of climate change risk and resilience in tourism in Samoa
ICKM	Information Communication Knowledge Management
ICT	Information Communication Technology
IFAD	International Fund for Agricultural Development
ILC	International Land Coalition
MNRE	Ministry of Natural Resources and Environment (Samoa)
MPA	Marine Protected Areas
NLTB	Native Lands Trust Board
NZAID	New Zealand Aid Programme
P3DM	Participatory Three-Dimensional Modelling
PGIS	Participatory Geographic Information Systems
PHC	Periodically Harvested Closures
SPREP	Secretariat of the Pacific Regional Environment Programme
PAFCO	Pacific Fishing Company
PwM	Partners with Melanesians
SamFRIS	Samoa Forest Resource Information System
SPC	Secretariat of the Pacific Community
SGP	Small Grant Programme
SIDS	Small Island Developing States
SP	Strategic Plan
SPC	Secretariat of the Pacific Community
SRIC-CC	Strengthening the resilience of our islands and our communities to climate change
ToT	Training of Trainers
TNC	The Nature Conservancy
UNDP	United Nations Development Programme

USAID	United States Agency for International Development
UWI	University of West Indies
VCD	Value Chain Development
5Cs	Caribbean Community Climate Change Centre
WHS	World Heritage Site
WTMA	Wet Tropics Management Authority
WWF	World Wide Fund for Nature

1 EXECUTIVE SUMMARY

After almost a decade since the introduction of Participatory Three-Dimensional Modelling (P3DM) in the Pacific, this impact study is aimed at assessing the direct outputs, outcomes and longer term impacts resulting from the interventions of the Technical Centre for Agricultural and Rural Cooperation (CTA) in support of the introduction, adoption, and replication of this process. By means of this study CTA takes stock of results achieved, lessons learned, success stories, and is eager to identify areas for potential improvement and upscaling. This study is based on face to face interviews, desk review and written exchanges with selected informants.

Background and context

Support to the adoption and replication of P3DM in the Pacific is line with CTA vision and corporate strategies. CTA 2007-2010 Strategic Plan (SP) drew attention on the potential of PGIS for improving the quality of planning through a participatory approach and for facilitating dialogue among disadvantaged communities and policy-makers. The 2011-15 SP highlights climate change adaptation and mitigation as top priorities for the Centre. The Regional Business Plan for the Pacific focuses on increasing resilience to climate change of agricultural value chains. CTA support to participatory mapping builds on synergies with its Web 2.0 and social media activities as well as value chain work.

Despite being very diverse, Pacific Island States present the perfect setting for implementing PGIS/P3DM processes. The increasing threat of climate change and environmental disasters has given prominence to reef to ridge approaches or integrated watershed management and planning, which can best be applied with the support of geo-spatial information methods. CTA identified the lack of a best practice in the position to enable local knowledge holders to produce accurate and geo-referenced datasets with low technological inputs as one of the main obstacles to increased community involvement in decision-making.

CTA efforts in promoting participatory mapping has been organised in two phases. The first phase started with the piloting of P3DM in Ovalau Island in Fiji (in 2005) followed by the adoption of P3DM in Papua New Guinea, Solomon Islands and East Timor. The second phase was kick-started by an orientation and project planning workshop “Participatory Mapping and Community Empowerment for Climate Change Adaptation Planning and Advocacy” held in Honiara, Solomon Islands, in 2012 where lessons learnt from the first phase were shared with a wide range of key stakeholders in the region. The workshop launched a three year inter-regional project *Promoting participatory ICTs for adding value to traditional knowledge in climate change adaptation, advocacy and policy processes in the Pacific and Caribbean (2012-2014)* which saw widespread replication of P3DM in the Pacific and the piloting of the process in the Caribbean. Through the PACC projects, UNDP mobilized participants from Samoa, Cook Islands, Palau, Vanuatu and Solomon Islands. All of these countries have either replicated the method or are planning to do so. This was a result of both a successful targeting strategy and the organization of the workshop in two parallel streams with a session dedicated to hands-on learning, including a field visit.

Outputs

At the level of individual staff taking part in the workshops in Ovalau and Honiara, trainees internalised the added value of genuine participatory processes and incorporated it in the work of their respective institutions. CTA supported the participation of staff from partner organisations in attending face to face and or distance learning courses in the domain of Web 2.0 and Social Media, as a useful complement to the skills acquired in participatory geographic information methods. Many of those who were trained by CTA in Fiji (2005) and Solomon Islands (2012) became actively involved both virtually and physically in an international community of practice. Through financial support provided by CTA they had the opportunity to take part as participants or resource persons in international conferences and fora where they shared their P3DM experiences with peers and like-minded organisations.

Furthermore, the Centre has been in the frontline in documenting and sharing PGIS/P3DM related experiences. Partners and local media have been also active in documenting P3DM processes. Throughout the years CTA continued to monitor and encourage the use of the process in the region. By providing highly specialized training and mentoring services CTA contributed to the establishment of solid P3DM centres of excellence: one in PNG (NGO Partners with Melanesians) and one in Samoa (consisting of a team from the ICCRIFS project and staff from the Ministry of Natural Resources and Environment).

Outcomes

Outcomes (i.e. the use of the acquired skills and knowledge in practicing P3DM and social media) were very satisfactory with the notable exception of partners' efforts in exporting community-generated data in GIS. Data extraction and digitization was conducted only in selected cases and overall did not receive due attention. As previously mentioned replication has accelerated since 2012. Two of the partner organisations (PwM and TNC) have been actively involved in scaling-up the process. The Wet Tropics Management Authority (WTMA) introduced P3DM with an aboriginal group in Australia in 2014. Replication was strongly driven by the training of trainers' approach which is a building block of CTA approach. Finally, all partner organisations have been putting significant effort in disseminating and showcasing their experience with P3DM with the support of CTA and TNC. Showcasing success proved important not only for promoting replication but also for securing additional funding.

Impacts

For the purpose of this study impacts refer to medium and long term changes within partner organisations. Partners were able to mobilise funds and acquire new service contracts on the basis of their reputation and proven record of success in implementing P3DM. There is evidence that CTA-led activities in the domain of P3DM have directly or indirectly contributed to many positive changes. These include supporting sustainable spatial planning and management, safeguarding cultural and landscape heritage, creating a platform for different generations to come together and learn from each other, providing additional sources of income and new livelihood opportunities. Finally, through P3DM local communities were able to influence local development policies, especially in Samoa.

Conclusions

CTA support to the introduction, adoption and replication of PGIS/P3DM fulfilled all expected results defined in the framework of the project *Promoting participatory ICTs for adding value to traditional knowledge in climate change adaptation, advocacy and policy processes in the Pacific and the Caribbean* and set as an assessment framework for this study. Best practices and lessons learnt were adequately documented, disseminated and adopted. All the interviewees fully understood the value added of participation in planning and advocacy process and applied the code of ethics and the new facilitation skills in their work. Staff from selected regional and national organisations is competent in using the PGIS practice and Web 2.0 applications in relation to climate change adaptation. Web 2.0 and social media was very useful to establish networks, reinforce partnerships, and start new collaborations. The establishment of regional centres of excellence in the Pacific is likely to create new avenues for expanding the use of P3DM in the region (for example, through South-South cooperation initiatives) and new P3DM are already in the pipeline. Main lessons include the need for long-term relationship of trust with partner organizations and long-term presence of these organizations and their staff on the ground. When government is willing to genuinely work with communities, ministries and government agencies are best positioned to ensure solidity, continuity and mainstreaming of the process. Community ownership is also essential and can be insured through inclusive processes based on free prior informed consent. Although the cost of PGIS/P3DM activities is relatively low for the standards of development agencies, the main obstacle to replication for Pacific Island Countries remains availability of funding. Along with the GEF small grant programme, CTA should explore opportunities to

work in partnership with IFAD Adaptation for Smallholder Agriculture Programme and SPREP, which is a key partner in the region.

2 INTRODUCTION

The adoption of Participatory Geographic Information Systems (PGIS) coupled with acquired skills in using web 2.0 applications and social media has proved to add value and authority to local knowledge and enable grassroots communities to have a voice in influencing policy development.

This impact study is aimed at assessing the direct outputs, outcomes and longer term impacts resulting from the interventions done by the Technical Centre for Agricultural and Rural Cooperation (CTA) in support of the introduction, adoption, and replication of Participatory Three-Dimensional Modelling (P3DM)¹ processes in the Pacific Region. CTA interventions occurred in two phases. The first phase was marked by the introduction of P3DM through a pilot project in the island of Ovalau (Fiji) in 2005² followed by nurturing networking, information exchange and remote coaching. This first P3DM exercise aimed at building capacity among technology intermediaries in the region. In 2007 the Ovalau process was granted the World Summit Award in the category e-culture.

The second phase was centred on a land mark event in 2012: a regional orientation and project planning workshop in the Solomon Islands³ aimed at sharing results and lessons learnt from the first phase and boost the spread of the P3DM method in the region to influence climate change adaptation, advocacy and policy processes.

In the Pacific, CTA work on P3DM will be assessed against the following three expected results defined in the framework of the 2012-2015 project “Promoting participatory ICTs for adding value to traditional knowledge in climate change adaptation, advocacy and policy processes in the Pacific and Caribbean”. These results apply also to activities carried out during the period 2005-2011 and were chosen as a common assessment framework.

- R1: Best practices in the use of PGIS (and related Web 2.0 applications⁴) and lessons learnt are well documented, widely disseminated and adopted in bottom-up planning and advocacy processes by selected national and regional bodies.
- R2: Staff from selected regional and national organisations are competent in using the PGIS practice (and Web 2.0 applications) in relation to climate change adaptation in Small Island Developing States (SIDS).
- R3: Regional centres of excellence in participatory spatial information and communication are established in each of the two regions⁵.

For the purpose of this report direct outputs refer to the actual products generated (e.g. knowledge products, events, trainings) and include changes in capability of the partner organisations or individuals representing such organisations as a direct result of CTA’s intervention. Outcomes refer to the *use* of the acquired knowledge and change in capability, including sharing lessons learned, replicating P3DM, training other individuals or organisations, liaising and establishing partnerships. Medium and long term impacts within

¹ P3DM is a spatial visualisation method falling under the umbrella term of participatory geographic information systems (PGIS).

² The Ovalau mapping exercise was conducted as part of the CTA project “Collaborative Spatial Information and Communication Management in the Pacific”.

³ The workshop “Participatory Mapping and Community Empowerment for Climate Change Policy Making” was held in Honiara, Solomon Islands, in May 2012 as part of the three-year Project “Promoting participatory ICTs for adding value to traditional knowledge in climate change adaptation, advocacy and policy processes in the Pacific and Caribbean”.

⁴ Capacity building in the domain of Web 2.0 and social media is complementary to PGIS as it empowers communities to better share and communicate the outputs of PGIS activities and has been ensured through the implementation of a dedicated sequence of sub-projects.

⁵ This report will cover the Pacific region only. A separate impact assessment report is planned for the Caribbean region.

the partner organisations refer, among others, to the use of *outputs* that contribute to effective spatial planning and influence policy making, proven capacity to mobilise funds for P3DM, and/or acquire service contracts to implement P3DM. On-the-ground impact usually materialises as a result of post-mapping activities, which build on the outputs and outcomes resulting from CTA-supported components (P3DM, and in some cases P3DM complemented by Web 2.0, and Social Media capacity building).

After almost a decade since the introduction of P3DM in the region, by means of this study CTA takes stock of results achieved, lessons learned, success stories, and is eager to identify areas for potential improvement and upscaling. The analysis provided by this study will be used to integrate PGIS/P3DM components into CTA's Regional Business Plan for the Pacific and leverage funding for up-scaling the use of the practice in the region.

2.1 Background

From the 1990s a solid body of knowledge and extensive experience was gained in South East Asia in practicing PGIS in the context of collaborative natural resource management and customary rights on resource tenure. In this context P3DM was widely used in

Participatory Three-Dimensional Modelling (P3DM) Method

P3DM consists of a community-based mapping method which integrates local spatial knowledge with data on land elevations and sea depth to produce stand-alone, scaled and geo-referenced relief models. Its core objective is to add value to traditional knowledge and facilitate grassroots influence in policy-making. Once the model is completed, a geo-referenced grid is applied on the model to facilitate data extraction and/or import, digitisation and plotting. The possibility of exporting to and importing data from GIS provides a bridge between technical and community-generated knowledge (Piccolella et al. 2013).

conjunction with Global Positioning Systems (GPS) and Geographic Information System (GIS) applications.

Despite being very diverse, Pacific Island States share enabling regulatory, legal and cultural frameworks for P3DM. These are traditional societies with strong chief leadership and mostly customary land ownership (97% of land in Papua New Guinea, 90% in Vanuatu, 88% in Fiji, 87% in the Solomon Islands, 81% in Samoa). Furthermore, many Pacific Island States present the ideal land area for building stand-alone scaled relief models in the position to store community-generated information. The increasing threat of climate change and environmental disasters has given prominence to reef to ridge approaches or integrated watershed management and planning, which can best be

applied with the support of geo-spatial information methods. Community-based mapping is a fundamental way for displaying traditional environmental knowledge and for communicating on issues related to the territory.

In the Pacific, the use of community-based geo-spatial information tools to support informed decision-making was in its infancy when P3DM was first introduced in Fiji in 2005. While some efforts had been made by NGOs and government agencies to introduce participatory planning methods, most village communities still relied on traditional gatherings where conversation is used as the main channel of communication. CTA identified the lack of a *best practice* in the position to enable local knowledge holders to produce accurate and geo-referenced datasets with low technological inputs as one of the main obstacles to increased community involvement in decision-making.⁶

2.2 Context

The CTA 2007-2010 Strategic Plan (SP) drew attention on the potential of PGIS for improving the quality of planning through a participatory approach and for facilitating

⁶ Rupeni et al. (2005) *Report on the Participatory 3D Modelling & Participatory GIS Exercise held on 4-13 April 2005 on Ovalau Island, Fiji*. WWF-SSP, July 2005.

dialogue among disadvantaged communities in Africa, Caribbean and Pacific (ACP) countries and policy-makers. Since then CTA has been spearheading a series of initiatives aimed at sharing lessons learned, identifying gaps and building on institutional and methodological synergies in the field. PGIS is in line with the Centre's mandate to 'strengthen policy and institutional capacity development and information and communication management capabilities of ACP agricultural and rural development organisations'.

The 2011-15 SP emphasises the disproportionate impact of climate change on food security in SIDS. Climate change adaptation and mitigation are considered as top priorities by the Centre. In response to this challenge, CTA expanded the PGIS thematic areas from land-use and natural resource management to environmental and climate change. In this context CTA promotes the establishment of enabling policy environments for implementing effective long-term adaptation actions. The SP also aims at enhancing ACP countries capacity in Information Communication Knowledge Management (ICKM) for agricultural and rural development (Strategic Goal 3), for example through the deployment of ICT tools and knowledge management practices favouring multi-stakeholder engagement and knowledge sharing.

This report is produced within the framework of the 2014-2016 project **MP3.1** '*Enhancing Institutional and Grassroots ICT Capacity to Influence Agricultural and Rural development Processes and Value Chain development*' and specifically its Sub-project **MP3.1.2** '*Participatory Spatial Information Management and Communication for Empowering Grassroots in Climate Change Adaptation, Advocacy and Policy Processes*'. Building on the successful introduction of P3DM in the Pacific, the current sub-project and its 2012-2014 antecedent *Promoting participatory ICTs for adding value to traditional knowledge in climate change adaptation, advocacy and policy processes in the Pacific and Caribbean* were geared towards up-scaling the adoption of the practice in ACP regions.

2.3 CTA Pacific Regional Business Plan

Based on regions' agricultural-sector priorities and its own comparative advantages, CTA has formulated Regional Business Plans (RBPs) for each ACP region, identifying pathways for the transformation of agriculture and CTA's possible contributions to this process. Each RBP identifies a set of actions that addresses challenges and realises opportunities specific to that region. The main goal of CTA's Regional Business Plan for the Pacific (2015-2017) is to increasing resilience to climate change of agricultural value chains as stated in its subtitle *Building high-potential and climate-change-resilient agricultural value chains, and improving the agriculture-nutrition pathway*. This is essential in a region severely hit by the impacts of climate change and weather extremes. Landscape has been changing for years in these countries but there is limited knowledge and information sharing among stakeholders on the impacts of climate change in the different areas and a meaningful engagement of smallholder agricultural producers in value chain deliberations and negotiations is often missing. Participatory 3D models can help overcome these challenges. 3D models can be used to identify new areas of economic development (including new market opportunities, new crops, or highlight the need to revive the production of traditional crops or traditional cropping methods), support discussion on diversification strategies and – by giving an holistic approach to landscape management – help to exploit the interlinkages between sectors such as agriculture, tourism, industry. By adding value to indigenous knowledge PGIS/P3DM helps developing the capacity of Pacific Island Countries to diversify production, enhance productivity and add value through quality niche products.

P3DM and Regional Business Plan objectives

- a) In line with the RBP objectives Participatory Three Dimensional Modelling helps (i) "*achieve targeted outcomes that are consistent with CTA's strategic directions*", that is desirable changes in policy design and implementation as well as in the lives and

livelihoods of small-scale operators; and (ii) “*regionally-defined agricultural and rural development goals*”, as the process is bottom up and opened-ended and therefore customized to the regional, national and local context.

- b) By increasing knowledge of their landscape and resources, as well as enhancing dialogue among the different stakeholders, people taking part in PGIS activities are better positioned to identify new employment opportunities including new “*market opportunities*”.
- c) CTA support to PGIS activities in the Pacific is cautiously planned in advance and negotiated with local partners in light of wider initiatives implemented in the region. This ensures “*CTA resources to be utilised optimally through avoiding overlaps and creating synergistic effects*”.
- d) Because of the significant results achieved on the ground and widespread replication, PGIS/P3DM provides “*a medium for interaction with partners, including possible funding agencies*”.

PGIS/P3DM and Regional Business Plan guiding principles

CTA has a demonstrated comparative advantage in PGIS and Web 2.0 and social media. It has been promoting these activities in Africa, Caribbean and the Pacific for ten years and has a recognized record of success. It has been able to establish strong partnerships with local and regional organizations working in these domains. These partnerships are backstopped by the support and inputs of a wide online community of practice that CTA staff has coordinated and continues nurturing.

PGIS/P3DM activities maximise synergies and allow to take advantage of economies of scale between different CTA programmes of work. Despite developed as part of the Policies, Markets and ICTs (PMI) Programme, these activities complement and build on those of the Knowledge Management and Communication (KMC) Programme⁷. Building on synergies originating from Sub-project **MP3.1.1** ‘*Upscale and institutionalise the use of Web 2.0 and Social Media for ARD and VCD*’, project **MP3.1**⁸ promotes the accessibility and effective use of PGIS, Web 2.0 and Social Media among its direct beneficiaries to stimulate their active participation and the one of their constituencies (indirect CTA beneficiaries) in planning out climate change adaptation strategies and in feeding their findings and proposed solutions into policy making processes. Both contribute to CTA’s strategic goal No. 3 *Enhancing ACP capacities in information, communication and knowledge management (ICKM) for agricultural and rural development*.

In line with the Regional Business Plan principles, PGIS/P3DM furthermore provides a flexible practice for engaging both women and youth and highlights the value of Information Communication Technology in the context of agricultural development.

In conclusion, PGIS/P3DM by i) providing a platform for bridging scientific and technical information with traditional knowledge, ii) giving grassroots a voice to influence policy making, iii) favouring inter-generational transmission of knowledge and, iv) preserving both tangible and intangible cultural heritage “*enables CTA to address the nexus between data, policy, research, education/training, and practice / grassroots level programme implementation*”.

2.4 CTA investment

While financial investment in introducing and promoting the practice in the Pacific has been limited since 2005 (see table below), great effort has been provided by CTA staff in: (i) remotely coaching or training practitioners and their institutions; (ii) building the reputation of

⁷ This includes strengthening of methodologies, skills and tools for knowledge management through the distribution of publications, trainings, virtual platforms, communication products etc.

⁸ ‘*Enhancing Institutional and Grassroots ICT Capacity to Influence Agricultural and Rural development Processes and Value Chain development*’.

institutions with proven track record in deploying P3DM; (iii) mobilizing resources via other donor agencies; (iv) stimulating exchanges of experiences via e-discussion fora; (v) documenting case studies; and (vi) facilitating professional linkages between individuals and institutions. Therefore any assessment of CTA investment in P3DM cannot ignore cost-effectiveness (i.e. costs compared to outcomes/impacts) and time-cost associated to these activities as indicators.

Table 1 Investment by CTA and partners in support to the adoption of PGIS in the Pacific

Years	CTA Project ID	CTA budget (EUR) – Pacific PGIS	Complementary funding		Activity and Project framework (title)
			(EUR)	source	
2004-2005	25210414	55,000	none	N/A	Support to the organisation and run of a P3DM exercise in Ovalau Island, Fiji Project framework: Collaborative Spatial Information and Communication Management in the Pacific
2005	27210536	9,000	none	N/A	Provision of support to 3 participants from the Pacific in attending the Mapping for Change Conference in Nairobi, Kenya
2007	25210414	9,000	none	N/A	Provision of support to 3 participants from the Pacific in attending the 2007 WSA ceremony in Venice, Italy Project framework: Collaborative Spatial Information and Communication Management in the Pacific
2011	21212030	5,700	none	N/A	Film production
2012	11141012	16,804	38,000	GEF-SGP	Facilitation of P3DM exercise in Trinidad and Tobago by PNG practitioners (contract 2012-228) Project framework: Promoting participatory ICTs for adding value to Traditional Knowledge in Climate Change adaptation, advocacy and policy processes in the Pacific and Caribbean
2012	11141012	72,403	65,393	UNDP, TNC	Awareness Raising and Planning workshop on 'Participatory Mapping and Community Empowerment for Climate Change Adaptation, Planning and Advocacy' Project framework: Promoting participatory ICTs for adding value to Traditional Knowledge in Climate Change adaptation, advocacy and policy processes in the Pacific and Caribbean
2014	11143034	10,100	39,966	GEF-IPAS	CTA participation in the 6 th World Parks Congress and related P3DM exercise among aboriginal people in Queensland Provision of support to 9 participants (4 from the Pacific) in attending the Congress Project framework: Participatory Spatial Information Management and Communication for Empowering Grassroots in Climate Change Adaptation, Advocacy and Policy Processes'
			12,000	UNDP	
Total		178,007	155,359		

2.5 Methodology

This study is based on face to face interviews, desk review and written exchanges with selected informants. Forty in-depth semi-structured interviews – conducted in the period 12 - 28 November 2014 – were recorded and transcribed for analysis. The interviews were held at the sixth IUCN World Parks Congress in Sydney and in the field (Fiji and Samoa)⁹. Most of the meetings in the field were arranged ahead of arriving in the country. The participation of the consultant in the World Parks Congress allowed her to fine-tune the field-work schedule and meet with key resource people¹⁰ involved in the implementation and funding of P3DM-related activities in the Pacific. Furthermore, the sessions organised by CTA and partner organisations on the topic also provided valuable information. While on the field, the consultant had the opportunity to visit the locations where the Participatory Three-Dimensional Models are stored and meet with both partner organisations (NGOs, Government and International Organisations) and villagers who took part in the mapping exercises and follow-up actions. Written exchanges and Skype conferences were necessary to collect supporting documentation and cross check data and figures. Detailed information on the field meetings is available in **Error! Reference source not found.**, **Error! Reference source not found.** and **Error! Reference source not found.**.

⁹ Since field interviews were conducted only in these two countries, results reported focus mainly on these cases.

¹⁰ Based in Papua New Guinea, Australia, Fiji, Samoa and Switzerland.

3 P3DM IN THE PACIFIC

3.1 Background

3.1.1 Piloting Participatory 3D Modelling

Ovalau Island in the Lomaiviti Province of Fiji was identified as the site for pilot testing P3DM practice in the Pacific because of the presence of several favourable factors: on-going initiatives which could benefit from *appropriate* mapping methods, a positive response from local community leaders, a rich local history and tradition, and the presence of some still pristine terrestrial and coastal ecosystems. The Fiji Locally Managed Marine Areas (FLMMA) Network¹¹ recognised the potential of the P3DM method for addressing overfishing and unsustainable farming practices and at the same time was looking into new ways for reaching out to local communities. Furthermore in order to protect its unique cultural heritage, Levuka, the old capital city located on Ovalau Island had been proposed as UNESCO World Heritage Site (WHS). At that time the various agencies involved in the process were struggling to engage local communities. Raising community awareness on the value of their cultural heritage and documenting traditional knowledge on the history and customs of the island were essential pre-requisites for supporting the proclamation process. On a more practical note, Ovalau Island was well documented in terms of topographic and bathymetric data, elevation contours and bathymetric lines being essential inputs in a 3D modelling exercise. The size of the island was considered ideal to develop a 3D model at 1:10,000 scale.

Mapping, including participatory mapping, was not new to conservation workers in Fiji. According to the Chair of FLMMA, Mr Alifereti Tawake, this was “an expansion or improvement of ongoing work”. FLMMA and its members such as the World Wide Fund for Nature (WWF) – who prepared the Project proposal for the P3DM exercise – were using participatory sketch mapping, satellite images and Geographic Positioning Systems (GPS).

In 2004 a PGIS process combining orto-photomaps and *Qoliqoli* (traditional fishing grounds) maps was started to develop a qoliqoli Management Plan by the Ministry of Tourism, the Beqa Island Tourism Council, the University of the South Pacific (USP) and the Native Land Trust Board (NLTB). Participants - who worked in groups - produced seven sets of separate annotated pictures. No comparison between the outputs occurred and the actual planning was deferred until the set of pictures had been compiled in GIS by facilitators *ex situ* (that is in their offices). Due to the lack of funding, facilitators did not bring the final maps back to the community, validation of the GIS maps by the workshop participants did not take place and the expected management plans were not produced. The Beqa Island exercise raised ethical questions about the building blocks of participation: ownership, empowerment, control, access and use¹².

3.1.2 Scaling-up P3DM

The successful introduction and adoption of P3DM firstly in Fiji and later in Papua New Guinea, Solomon Islands and East Timor suggested its appropriateness in the context of SIDS, especially in face of the increasing threat of environmental and climate change, and related disasters. At the same time grey literature highlighted the value of P3DM for planning climate change adaptation because of the technical characteristics of the method and of its process bridging top-down interventions with bottom-up contribution of the affected

¹¹ The Fiji Locally Managed Marine Area (FLMMA) network is a non-profit and charitable association working to promote and encourage the preservation, protection and sustainable use of marine resources in Fiji by the owners of marine resources. It consists of members representing the island's village communities, research institutes and international non-profit organisations.

¹² For a comparative analysis read: Rambaldi, G. Tuivanuvou, S. Namata, P. Vanualailai, P. Rupeni, S. and Rupeni, E. 2006. *Resource use, development planning, and safeguarding intangible cultural heritage: lessons from Fiji Islands* in IIED Participatory Learning and Action (PLA 54).

communities¹³. In such a context CTA designed the three-year inter-regional 2012-2014 project *Promoting participatory ICTs for adding value to traditional knowledge in climate change adaptation, advocacy and policy processes in the Pacific and Caribbean*.

The project was aimed at scaling up the use of P3DM/PGIS in the region and introduce it to the Caribbean, starting with Trinidad and Tobago. CTA collaboration was requested by partners in the two regions because of its expertise in the domain of PGIS practice, Web 2.0 and Indigenous Knowledge Management. This project was nested into larger climate change adaptation initiatives funded by UNDP, TNC, AusAID, and GEF-SGP (~34.3 Million USD). Other involved actors include various national governments in the Pacific, and the University of West Indies (UWI), the Caribbean Natural Resources Institute (CANARI) and the Caribbean Community Climate Change Center in the Caribbean.

3.2 Outputs

Outputs refer to the actual products generated (e.g. trainings, events, knowledge products,) and include changes in capability of the partner organisations or individuals representing such organisations as a direct result of CTA's intervention.

3.2.1 Capacity building in participatory spatial planning

CTA was directly involved in the organisation of two events having capacity building purposes. The first took place in Ovalau, Fiji in April 2005 and the second one in Honiara, Solomon Islands in May 2012.

Ovalau workshop

In Fiji 30 students and close to 100 people from 27 villages – with the support of 18 trainees and three resource persons from 15 different local, regional and international institutions¹⁴ – built a Three-Dimensional Model of the entire island. The model helped identifying 79 types of legend items¹⁵ including 35 different land uses and covers and 83 places of cultural heritage significance.

Participating organisations significantly benefited from taking part in the modelling exercise at different levels.

At the level of individual staff taking part in the workshop, trainees internalised the added value of genuine participatory processes and incorporated it in the work of their respective institutions. Vilimaina Civavonovono, Senior Technical Assistant at the Fiji Ministry of Agriculture – who has been working in the GIS Unit of the Land Resources Planning and Development Division of Fiji for 12 years – claimed: “I am conscious now when I do my mapping I must understand the purpose of the map. Especially if this information can create conflicts. [...] What I learnt is the importance of the participatory process”. The workshop raised awareness on how to work with communities while respecting ethical principles: “handing over the stick” (i.e. not imposing choices and behaviours), being transparent, allowing time, ensuring ownership of the final product. This resulted particularly important in Fiji where, as in many developing countries, the growth imperative often contrasts with the

¹³ Piccolella, A. ‘Participatory mapping for adaptation to climate change: the case of Boe Boe, Solomon Islands.’ Paper submitted in August 2011 to the London School of Economics and Political Science, later published on the *Knowledge Management for Development Journal* (2013) 9(1): 24-36.

¹⁴ CTA, Native Lands Trust Board (NLTB), WWF, Partners With Melanesians Inc., The Nature Conservancy, Wet Tropics Management Authority, FLMMMA, Ministry of Fisheries and Forest, University of the South Pacific, Ministry of Agriculture, National Trust of Fiji, Lomaiviti Provincial Officer, Ministry of Tourism, SOPAC/EU Project “Reducing Vulnerability in the Pacific ACP States”, SPC.

¹⁵ Points, lines and polygons in the form of pins, yarns and paint represented land use and cover, households, schools, churches, economic activities, places of cultural interest, traditional fishing grounds etc.

need to safeguard both local culture and increasingly vulnerable marine and terrestrial ecosystems.

Figure 1 Ovalau Islands residents populating the 3D model (April 2005)



Sukulu Rupeni, who used to work as the [FLMMA](#) Communication Coordinator, right after the Ovalau workshop prepared a proposal with the Institute of Applied Science (IAS) for engaging youth in climate change adaptation through a series of participatory learning and action techniques including participatory theatre. She also used mapping for identifying disaster prone areas and adaptation planning. She recalls having noted how participants and the community at large felt empowered through the P3DM exercise and that that was truly inspirational for her.

According to M'Lis Flynn, Project Officer at the Australian [Wet Tropics Management Authority](#) (WTMA) being involved in that training, learning to be a facilitator, made her realize she really enjoyed community facilitation. "I really enjoy that role and P3DM is such a good technique that I wanted to make it happen somewhere else". And this was what she did in October 2014 when she coordinated the first P3DM done from beginning to the end by an aboriginal group in Australia (see Annex 1 Case study: Reconnecting aboriginal people with their Country: the case of Mandingalbay Yidinji people, page 41).

[Partners with Melanesians Inc. \(PwM\)](#) – a Papua New Guinea-based NGO – used to generate maps for proposed conservation areas starting from waypoints collected through GPS. Field work had to be often interrupted because of adverse weather conditions and challenging logistics. Discovering an alternative method for producing scaled maps reflecting grassroots' knowledge, priorities and perspectives revolutionised the way PwM works (see Annex 2 Case study: Training of Trainers: the case of Partners with Melanesians on page 42).

All interviewed trainees stated that their experience went beyond learning the different steps of a new mapping methodology.

Honiara workshop

The Orientation and Project Planning workshop *Participatory Mapping and Community Empowerment for Climate Change Adaptation Planning and Advocacy* was aimed at reinforcing the process started in Ovalau in 2005, share lessons learnt and reinvigorate

replication. CTA, PwM, TNC and UNDP formed a unique partnership to capitalize on their experience and networks in the Pacific and make sure that key stakeholders were exposed to the method.

The landmark event brought together more than 80 people from 17 countries, including Australia, Cook Islands, Federated States of Micronesia, Fiji, Italy, The Netherlands, New Zealand, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, St. Vincent and the Grenadines, Trinidad and Tobago, UK, USA, and Vanuatu.

Figure 2 Villager describes the 3D model during the regional workshop in Honiara



The workshop was structured in two parallel streams. While participants were exchanging experiences about participatory GIS practice and the role of innovative ICTs in facilitating community empowerment and active participation in decision-making and how P3DM can be used to document, geo-reference and visualise local knowledge, selected residents from Naro village in Guadalcanal were building a mini-3D model of their village area. Participants were exposed to a practical demonstration of the different steps in the process. They were also exposed to participatory videos and web-based applications which could be used to complement the map-making process and add authority to its outcome. At the end of the workshop they were aware of the importance of obtaining Free Prior Informed Consent (FPIC) and the potential risks involved in practicing participatory mapping and related mitigation measures. The success of the event was precisely linked to the combination of theoretical sessions, with hands-on learning and more interactive sessions where participants were given the possibility to plan their own country-specific P3DM activities. According to Gabor Vereczi, UNDP Technical Advisor for the Pacific Region and Pacific Adaptation to Climate Change (PACC) Coordinator, “the fact that the model was built right there made it very real. The most impressive part of the workshop was to take the model to the village. The villagers recognised what is in their land. They started discussing among each other and teaching to the kids. People identify themselves with it.” This was key for convincing UNDP to further assist their national partners to uptake the method.

3.2.2 Improving relationship with constituency and partners

The value added of P3DM is the process of building trust, getting to know and learning from each other both at the community level, among the community and the project people, and among the different partners involved.

In **Fiji** because of its unique characteristics, the P3DM exercise in Ovalau provided an excellent team-building environment. Traditional facilitation methods including open discussion, focus groups or presentations are often based on passive listening and can amplify power unbalances among the different actors. Government bodies and staff are often mistrusted. Technical experts use language and modes of communication which may be difficult for community members to understand. P3DM modifies the traditional logic and gives voice to local traditional knowledge holders. Everybody can touch the model and contribute with his knowledge avoiding direct confrontation. The model becomes a medium. According to Ms Civavonovono from the Ministry of Agriculture, the institution could appreciate the value of working with communities and getting their consent before implementing initiatives. FLMMA saw in P3DM an innovative way to approach and work with local communities in Ovalau. *De facto*, the P3DM paved the way for extensive community work. A planning workshop directly linked to the P3DM took place in July 2005. Other meetings followed. The involvement of students was a milestone for FLMMA and since then youth has always been engaged in project activities. Within the network “that process added value to our partnership in FLMMA. The technical people, like government officials and GIS experts, suddenly had a role in terms of community management” (Etika Rupeni, IUCN, former WWF staff). At the time of the P3DM workshop the FLMMA Network was relatively young. Throughout the process working relationships strengthened and improved.

The P3DM model provided a bridge with the community in terms of seeing and relating to the end product of the project. (Yvette Kerslake, ICCRIFS Project Coordinator)

In **Samoa**, the establishment of a relationship of trust was the turning point in the ICCRIFS project. According to the Agroforestry Officer, Luaiufi Aiono, without such a relationship the project would have not been able to achieve the same results. Working together on the models (a total of 16 were produced in Samoa as of the writing of this report) helps better conveying what the Project objectives are and its

expected impact on the community. Also P3DM helped the different divisions and ministries to open a constructive dialogue and balance their views on the development of these areas. For example, the Ministry of Agriculture has often interests conflicting with those of the Ministry of Natural Resources and Environment. All relevant Ministries were involved in the process and that helped conciliating interests and clarifying objectives. The broker role played by the Ministry of Women, Community, Internal Affairs and Social Development was also crucial. They established the first contact with the communities, which is a common praxis in Samoa, and were involved throughout the process thus ensuring that gender mainstreaming and community empowerment were taken in high consideration. It is interesting to note that the model for the Apia catchment led by the Water Division was initially planned to match and complement the model for Lake Lanoto'o. This would have provided an overview of the landscape from reef to ridge and from ridge to reef on the other side. However, because of a technical misunderstanding¹⁶ the models are not proportionate and cannot be joined.

¹⁶ The Water Division used the double number of cardboards assuming that a larger scale (1:5,000 vs 1:10,000 used for the first models) would require such a change.

"P3DM is a great tool for us in Samoa. It is really helping our communities, schools and all stakeholders to understand the different scenarios, topography and the allocation of different resources. I believe that is very helpful. Sometimes when we are carrying out consultations people are a little bit confused on what we are talking about. A picture speaks more than 1000 words" (Suluimalo Amataga Penaia, Chief Executive Officer, MNRE).

In Epi Island in **Vanuatu**, for the first time Chiefs came together to discuss and agree on substantial development projects. The island is much dissected because of the presence of a volcano and there are four different chiefs. Gabor Vereczi, PACC project Coordinator said: "in the past it was very difficult to achieve consensus over key issues. This project in the framework of PACC deals with coastal infrastructure for climate change... some critical infrastructure, quite investment heavy. If it wasn't for the model I don't see how you could get a thorough agreement among these chiefs. This helps taking very long term decisions."

"Attending the P3D modelling in 2005 and the recent Web 2.0 training that was conducted in PNG in 2014 places myself and my organisation in a position that we can easily communicate what we are doing on P3DM to other stakeholders both at government level, local communities, with access to internet and Facebook, to very important policy makers as the Minister himself and the Deputy Secretary"
(Kenn Mondiai, PwM, PNG)

In the **Solomon Islands** and **PNG** – where P3DM was carried out by organizations with a long history of collaboration with the local communities – the process reinforced long-term relationships of trust and set the ground for further collaboration opportunities.

3.2.3 Capacity building in Web 2.0 and Social Media

In order to assist partner organisations to strengthen their capacities in sharing information, communicating and advocating for policy reform or development, CTA supported the participation of staff from partner organisations in attending face to face and or distance learning courses in the domain of Web 2.0 and Social Media. This contributed to improving their online visibility and reputation. PGIS/P3DM activities are best valued when they are made visible and shared with the wider audience. Training in Web 2.0 for Development (or Web2forDev) has been targeted in the Pacific to those countries and organisations which could capitalise on existing PGIS capacity.

In 2011 and 2012 face to face Web 2.0 and Social Media trainings took place in **Fiji**, while in 2014 and 2015 face to face events took place in **Cook Islands, Papua New Guinea, Samoa and Vanuatu**. Additional capacity building in the domain of Web 2.0 and Social Media was offered over the period 2011-2015 via distance learning courses run by UNITAR and paid for by CTA to individuals from **Cook Islands, Fiji, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu**. Key stakeholders were trained including staff from agencies involved in PGIS/P3DM processes specifically to enhance their capacity to collaborate and to create, share and publish information and eventually mount advocacy campaigns.

3.2.4 Sharing, learning and networking opportunities

Many of those who were trained by CTA in **Fiji** (2005) and **Solomon Islands** (2012) became actively involved both virtually and physically in an international community of practice. Through financial support provided by CTA they had the opportunity to take part as participants or resource persons in international conferences and fora where they shared their P3DM experiences with peers and like-minded organisations. Three participants took part in the Mapping for Change Conference in Nairobi, Kenya in September 2005 and other three took part in the World Summit Award ceremony in Venice, Italy in November 2007. For

some of them, this was the first time leaving their country of origin. Others attended briefings organised in Mauritius, the 2012 Caribbean Week of Agriculture in Antigua, meetings and workshops at CTA in Wageningen. The Nature Conservancy (TNC) funded GIS training for PWM staff in order to capitalize on their PGIS skills.

In September 2014, CTA contributed to the lessons sharing event organised by the Ministry of Natural Resources and Environment (MNRE) of Samoa during the Third International Conference on SIDS “*Increasing resilience to climate change and sustainable management of natural resources through participatory three dimensional models with communities in Samoa*”. A presentation on the value of P3DM in the context of climate change was delivered by an international consultant¹⁷ who was representing CTA at the event.

In November 2014, a lesson sharing event¹⁸ was organised during the sixth IUCN World Parks Congress in Sydney, Australia. The event was not limited to the Pacific but was aimed at sharing lessons from different regions of the world both among PGIS practitioners and the wider audience. It is important to note that having the event in Australia encouraged the presence of many stakeholders and partners from the Pacific. CTA supported the participation of resource persons from Papua New Guinea, Fiji and Samoa but many others took part in the event self-funded or with the support of other organisations. Seven participants and partners in the Ovalau training and two participants in the Honiara workshop were present at the Congress. This ‘reunion’ provided an opportunity to reflect on achievements and challenges in the Region, the occasion to renew partnerships, and explore options for future collaborations. CTA received several requests of support for developing P3DM exercises in the Pacific. Notably the FLMMA Network showed a renewed interest and willingness to replicate the P3DM experience in Fiji. The World Parks Congress also provided an opportunity for networking and getting up to date on the state of the art of conservation and environmental management policies and practice.

Box 1 P3DM internationally recognized as a best practice

In 2007 P3DM was considered one of the 40 best practice examples of quality e-Content in the world. The *Participatory 3D Modelling (P3DM) for Resource Use, Development Planning and Safeguarding Intangible Cultural Heritage in Fiji* was granted the World Summit Award. Started in 2003 the Award is an initiative of the United Nations World Summit on Information Society (WSIS) organised by the International Center for New Media which honours excellence in multimedia and e-Content creation. A special emphasis in this Award is placed on products/processes which show the benefits of information and communication technology (ICT) for the development of society at large. P3DM was granted the award in the category E-culture as a project aimed at “preserving and presenting cultural heritage in line with the challenges of the future; demonstrating valuable cultural assets clearly and informatively using state-of-the-art technology.”

3.2.5 Publishing and disseminating knowledge products

CTA does not only provide partners with capacity building in cutting edge technologies for knowledge management but the Centre has been in the frontline in documenting and sharing PGIS/P3DM related experiences. CTA documented the Honiara workshop activities both on a daily basis through publishing blog posts ([PPGIS/ PGIS Blog](#)) and with a workshop Report. To support awareness rising on good PGIS practice it created a video library available on CTA’s Vimeo PGIS channel: <https://vimeo.com/channels/pgis>. As of the writing of this report the Channel features 62 video productions, mostly produced by CTA, of which

¹⁷ The author of this Report delivered the presentation.

¹⁸ Side event *Voices and Choices: The risks and values of geo-referencing traditional and local knowledge* held at the sixth IUCN World Parks Congress. Participants from the Pacific were also involved in other two activities organised by CTA: one side event focused on PGIS in Africa and a P3DM demonstration exercise by the Mandingabay Yidinj Traditional Owners.

thirteen document the deployment of P3DM in the Pacific. The Centre kept on nurturing a virtual community on <https://dgroups.org/groups/ppgis> as well as posting or sharing updates on the PGIS/P3DM practice in the Pacific on <http://pgis.cta.int/>, <http://www.iapad.org/> and <http://participatorygis.blogspot.com>. The occurrence and location of P3DM exercises is monitored via an online Google Map (<http://goo.gl/ohgYKL>).

This study is part of the range of knowledge management activities planned by CTA as part of its project management strategy and is also contributing to the identification and documentation of cases to be published in year 2015 as part of CTA success stories series.

Partner and media reports and articles have also provided a valuable body of knowledge for analysis and sharing (see References). Local media and in selected cases international media channels (such as [Al Jazeera](#)) extensively covered PGIS/P3DM activities in the Pacific. Many of the requests for replicating P3DM in Samoa were triggered by news appeared in the local media. The 1st model done in Samoa raised a lot of interest when showcased on national radio and TV, printed and electronic media. Many communities could see the interest and relevance for good community development planning and natural resource use. Word of mouth also played a role in this. The use of Social Media ([Facebook](#), [Twitter](#)), online platforms ([PPGIS.net list](#), [PGIS CTA](#), [PPGIS blog](#)) and video production has significantly contributed to disseminating information on P3DM practice.

3.2.6 Establishing centres of excellence in the Pacific

Providing highly specialized training and mentoring services contributed to the establishment of solid P3DM centres of excellence. In less than 10 years PwM, an NGO based in PNG, has gained a reputation of an organisation which is competent in P3DM facilitation and has ended up facilitating several exercises in both the Pacific and Caribbean. The Forestry Division of the Samoan MNRE can be rightly considered as a second centre of excellence in P3DM and has become a point of reference for P3DM in the country and increasingly in the region. According to Yvette Kerslake, Coordinator of the *Integration of climate change risk and resilience into forestry management in Samoa (ICCRIFS) Project*, her team was able to extend P3DM to all of the three Project sites¹⁹ and beyond because of the technical advisory and support received by CTA. The fact that support to replication was part of the planned activities of the 2012-2014 CTA project *Promoting participatory ICTs for adding value to traditional knowledge in climate change adaptation, advocacy and policy processes in the Pacific and Caribbean* made support to Samoa readily available with no need to go through complex project approval processes. CTA provided training materials (the manual *Participatory Three-dimensional Modelling: Guiding Principles and Applications* and the *Training Kit on Participatory Spatial Information Management and Communication*) and assisted MNRE through the process leading to the P3DM exercise, remotely. Most importantly CTA was instrumental for putting MNRE in touch with PwM, which was hired by the ministry for the facilitation of the 1st exercise *in situ*.

3.3 Outcomes: Replication and Effective Use

Outcomes refer to the *use* of the acquired skills and knowledge in practicing P3DM (and social media), including replicating P3DM processes, managing generated data, training individuals or organisations, sharing lessons learned, liaising and establishing partnerships, etc.

3.3.1 Replication of the P3DM process

Two of the partner organisations (PwM and TNC) have been actively involved in the replication of the process both in the Pacific and the Caribbean. The Wet Tropics Management Authority (WTMA) introduced P3DM in Australia in 2014. Also in this case P3DM was championed by one of the participants in the 2005 Ovalau workshop. CTA

¹⁹ Lau'i'i-Falevao, Mauga o Salafai and Lake Lanoto'o.

continued to monitor and encourage the use of the process in the region, acted as a reference hub and in selected cases provided technical advice and training material. Over the period 2006-2012 it did not fund any of the follow-up 3D modelling exercise in the Pacific. As mentioned, the degree of autonomy and self-reliance achieved by PwM suggests that a regional Centre of excellence had been created. Staff from TNC, trained in 2005 in Fiji introduced P3DM to the Solomon Islands, specifically in the Choiseul Province. Initially P3DM was used for reviving memory of traditional customs and stories and later on for defining customary boundaries and explore forest use options different from logging. TNC and PwM worked together in the Solomon Islands piloting the use of P3DM for planning adaptation to climate change (Boe Boe village, Choiseul Province).

As shown in Annex 7, since May 2012, eighteen P3DM exercises have been carried out in the Pacific as a direct follow up to the Honiara workshop²⁰: sixteen in Western Samoa, one in Palau and one in Vanuatu. In the last years also four other models unrelated to the workshop in Honiara were built (one in Solomon Islands, two in Papua New Guinea, and one in Australia). The P3DM in Papua New Guinea and Australia were carried out by facilitators trained in Ovalau in 2005.

The fact that the introduction of this method in **Samoa**, **Palau** and **Vanuatu** was planned during the planning session of the 2012 workshop in Honiara, witnesses a direct linkage between workshop outputs and subsequent outcomes. Having a dedicated time to brainstorm and plan while still fully immersed in the training has certainly contributed to overcome the risk of inconsequentiality. Whereas in the case of **Samoa** and **Palau**, CTA provided technical advisory support and or training material, in the case of Epi Island, **Vanuatu**, partners conducted the P3DM without either financial or technical support from CTA. Despite the lack of hands-on experience of the agencies operating in Vanuatu, the P3DM of Epi islands proved to be very effective (see section 3.4.2 on page 27). In Vanuatu, the project team is planning to develop a second P3DM with additional funding. Same happened in **Palau** where the Director of Palau Public Land Authority has approached PALARIS GIS technical staff to develop another model.

The most outstanding results in terms of replication were achieved by Samoa²¹. During the Honiara workshop the Samoa team prepared an action plan for developing a P3DM for Lake Lanoto'o within the framework of the ICCRIFS project. Once back home they preferred to prioritize the area from Lauli'i to Falevao in Upolu²². Lake Lanoto'o and Mauga o Salafai (in Savaii) were covered at a later stage. In February and March 2015 Samoan Tourism Authority, the UNDP Gef-funded ICCRITS project and the MNRE Forestry Division worked in Manono Island, Upolu and Savaii to develop Tourism Development Areas management plans resilient to climate change through P3DM. Having all key government²³ and regional stakeholders involved in the process has been key to replication. At the time of writing Samoa had new P3DM projects in the pipeline²⁴ and the Forestry Division team was requested from the Secretariat of the Pacific Regional Environment Programme (SPREP) to provide technical assistance in **Tonga**. **American Samoa** also showed interest in

²⁰ Through the PACC programme, UNDP mobilized participants from Samoa, Cook Islands, Palau, Vanuatu and Solomon Islands. All of these countries have either replicated the method or are planning to do so (i.e. Cook Islands). This suggests that targeting of trainees was very effective.

²¹ Samoa will be used interchangeably with Western Samoa below.

²² Reasons behind include: i) this is customary land and not government land unlike Lake Lanoto'o and Mauga o Salafai which include National Parks, ii) the area faces serious climate change problems because of the characteristics of the terrain.

²³ Key stakeholders include the MNRE with the Planning and Urban Management Division (PUMA), Forestry Division, Water Resources, Infrastructure, Disaster Management Office, People Services; the Ministry of Agriculture; and the Ministry of Women, Community, Internal Affairs and Social Development. MNRE also collaborated with Samoa Tourism Authority.

²⁴ The Water Division has planned to cover the Vaisinago sub-catchment and the PACC project through UNDP-SPREP is planning to cover Tafitoala Watershed.

developing participatory 3D models and requested Western Samoa for assistance. In May 2015 the UNDP-funded project in **Cook Islands** named “Strengthening the resilience of our islands and our communities to climate change (SRIC-CC)” requested assistance from MNRE and CTA to pilot test the P3DM process in the island of Mangaia. The case study described in Annex 4 offers a closer look to what happened in Samoa.

For a complete overview of P3DM activities in the Pacific see Summary table in Annex 7.

3.3.2 Data back-up through extraction and digitization

Extraction of data and their import and storage in a Geographic Information System (GIS) environment is and should be standard part of the process particularly in the context of climate change. By overlapping vulnerable conditions and potential impacts, a GIS multi-layered map may favour a dynamic and more comprehensive understanding of risk. The study assessed that out of the many P3DM exercises done in the Pacific data extraction and digitization was conducted only in selected cases and overall did not receive due attention.

In **Fiji**, the Ovalau three-dimensional model was geo-referenced and hence data could be extracted and later on digitized. Data extraction, geo-referencing and digitisation were done as a follow-up to the workshop by the Native Lands Trust Board. The involvement of a GIS expert in the workshop was key to this end. Thematic maps were created for the purpose of using these with communities to develop resource use and management plans. However, this study could not ascertain the actual use of these digital maps during the ensuing community workshops because of change in position and responsibilities within the involved organisations (i.e. WWF, Ministry of Agriculture, NTLB). According to the interviewees the villagers prepared their plans around the physical model, it seems that local organisations missed the opportunity of using the printed maps as a backup and mobile reference. To date partner organisations do not have a copy of the digitised maps produced in 2005.

In **Samoa**, at the time of writing only the digitisation of the models from Lauli'i to Falevao and the Muaga o Salafai was completed. However, the Forestry Division has planned to digitize all of the models produced in Samoa. The involvement of the GIS officer as a key resource person from the beginning (he was among the two officers who were chosen to be trained in Honiara) was key to this end. The digitised versions of the models will be used as a backup by the Ministry to plan follow up activities once the models will be housed in the villages. The intention of the Water division is to update land use changes on the digitised models. Having completed all the steps of the P3DM up to transposing community-generated information in GIS is symptomatic of Samoa having truly understood and fully exploited the potential of this methodology.

In the **Solomon Islands**, on the other hand, this potential was not fully exploited. In fact, while a Digital Elevation Model was used to refine and ground-truth features on the relief model, the information elicited from the model has not been transferred to GIS. The only effort to integrate the information gathered at the grassroots level into a more sophisticated ‘scientific’ map has been a partial transfer to photomaps (Leon 2011 pers.comm.).

In **PNG**, staff from PwM has been exposed to training opportunities²⁵ to strengthen the NGO's GIS capacity. However, the models have not been digitised yet. This can be attributed to both a lack of confidence and time from the trained staff. Although he had some GIS background he found that the 2-week training was too short. To address this shortcoming, in February 2015 CTA supported a cross-visit of the PwM staff to Samoa where he was trained by MNRE in GIS applied to P3DM and specifically in the preparation of maps, data capturing, extraction and digitization.

²⁵ These were funded by TNC as part of their contract for the development of P3DM models in PNG.

3.3.3 Training others in organizing and facilitating P3DM processes

Most P3DM exercises which followed the 2005 Fiji mapping exercise and were directly or indirectly supported by CTA had a training of trainers (ToT) component which is a building block of CTA approach. To date PwM has trained many people in Papua New Guinea, Solomon Islands, Samoa, and Trinidad and Tobago. The Director of PwM started with training his own staff (four people). However, only one of these was later engaged in facilitation.

In **Samoa**, starting from two staff only trained in Honiara and with the support of PwM, the MNRE used the pilot P3DM as a training ground for representatives of different divisions within the ministry and other ministries. This provided the basis for creating a core technical team of around seven people who contribute to facilitate P3DM exercises. Four of these are able to facilitate the process from the beginning to the end. Each of the staff specialised according to their skills and natural attitudes. For example, taking the community through the process and gaining their free prior and informed consent is a delicate step and requires excellent communication skills. Some other staff can better contribute to preparing baselines, materials and overseeing the physical construction. Because of the importance of having a grand opening and grand closing the Assistant CEO for Forestry or the ICCRIFS project Coordinator was always involved to raise the profile of these events. Staff from the Water division was able to lead the facilitation of the P3DM of the Apia catchment area after being exposed to training from their colleagues from the Forestry Division. Disaster Management office and Planning and Technical Services division is also interested in going down this path.

Every time the Forestry Division carries out a new P3DM it brings in more officers and their team can expand. This without counting the possibility of villagers replicating the process. Many requests were put forward by the villages involved in the previous mapping exercises to build a model covering exclusively their own village. For example, the mayor of Lalomauga asked financial support to JICA (Japan International Cooperation Agency) for building a village-level model for reducing flood risk. This would allow engaging a greater number of residents and raise community awareness on disaster risk. In other cases, villagers would like their own model to overcome the sensitive issue of where to store the model as many villages were involved in its construction and each of them would like to own it.

3.3.4 Disseminating information and showcasing P3DM

Based on available online publications, blogposts, reports and multimedia, this study assessed that all partner organisations have been putting significant effort in disseminating and showcasing their experience with P3DM and that CTA and TNC have been instrumental in supporting the effort.

In **Fiji**, the process was duly documented through reports, journal articles and video production. The final report is the most comprehensive reference on the workshop. The article *Resource use, development planning, and safeguarding intangible cultural heritage: lessons from Fiji Islands* published on IIED PLA 54 instead offers an interesting comparative analysis. A media consultant (In Focus Arts) was hired by WWF to produce a 20-25-minute video documenting the mapping exercise in Ovalau. Due to poor quality of the output, his production was never made public. Instead, using the available footage, in 2013 a UK producer compiled the video production currently available on Vimeo. The video *Mapping Land, Sea and Culture: an Award-winning Participatory 3D Modelling Process in Fiji* uploaded on Vimeo at the time of writing had been played 670 times online, mostly embedded in the Society for Applied Anthropology website, Participatory GIS Blog, Facebook and CTA website. A list of articles, videos and other knowledge products is included in section 7 'References' at page 59, Annex 10 List of documented media coverage' and Annex 11 List of Video Productions'.

A case study on **Vanuatu** P3DM is available on the SPREP website²⁶ and is illustrated in a video²⁷ produced by the project.

In the **Solomon Islands**, TNC has been very active in producing short videos and disseminating them through online development community platforms.

Sharing information on the internet adds authority to it and makes it more influential. In the case of **PwM** the acquired skills in Web2.0 and social media have been key to raising the profile of their activities. The [PwM P3DM Programme Facebook Page](#) attracted the attention of the Papua New Guinea Ministry of National Planning, which showed interest in P3DM for rural development planning.

Paulo Amerika, Communication and Knowledge Management officer for the ICCRIFS project in **Samoa**, highlights the benefits of Web2.0 for enhancing communication with key stakeholders. However, there are some bureaucratic constraints in Samoa for public officers to share information on social media on behalf of their institutions. For example, Project staff has been using their personal Social Media accounts only. Following Samoan P3DMs on Facebook was sufficient to revive the interest of the Secretariat of the Pacific Community (SPC) in the method and put forward a request for capacity building in P3DM to be later applied in Cicia Island, Fiji.

As mentioned, lessons learnt from the Ovalau mapping exercise were shared in a number of international events, namely, the 2005 Mapping for Change Conference in Kenya, 2007 World Summit Award Ceremony in Italy and 2014 IUCN World Parks Congress in Australia. The MNRE of **Samoa** showcased its achievements in using P3DM for mainstreaming climate change in forestry management during the September 2014 SIDS Conference in Apia. The ICCRIFS project organised the side event *Increasing resilience to climate change and sustainable management of natural resources through participatory three dimensional models with communities in Samoa* which highlighted this work in the national, regional and international context. The combination of the official launching of P3DM in Samoa with the signing of the Pacific Mangrove Charter showed the linkages between appropriate participatory spatial planning tools and policy-processes, and raised the profile of P3DM work²⁸.

The 3D models were transported to the SIDS Conference venue for the occasion and were displayed for the public. The Conference was attended by more than 4,000 participants from 115 countries providing an important stage for showcase. Furthermore, the team organised a field visit to Luatuanu'u, one of the villages involved in P3DM. Helen Clark, UNDP Administrator, publicly praised Participatory 3D Model. Naoko Ishii, GEF CEO & Chairperson was happy to see how their "resources are so effectively used."

Finally, the ICCRIFS project experience was also shared in one National Workshop (facilitating exchange of experience with other GEF funded projects) and in one regional conference for the Pacific.

The exercise facilitated by the Wet Tropics Management Authority (WTMA) in North Queensland, **Australia** in 2014 involving the Mandingalbay Yidinji Traditional Owners was well documented both in the form of articles and video productions. In addition a replica of the model and its life population was displayed at the November 2014 World Park Congress in Sydney attracting widespread interest by development actors and indigenous communities.

²⁶ PACC Technical Report No. 10 - Using P3DM to Facilitate Community Decision Making: A Case Study from the Vanuatu PACC Project (2014). Available at: <http://goo.gl/9hUrm6>.

²⁷ Participatory 3D Modelling (P3DM) for bottom-up decision-making in Vanuatu <https://goo.gl/Q52faE>

²⁸ The Environment Ministers of Federated States of Micronesia, Marshall Islands, Palau, Samoa and Vanuatu as well as top representative of major regional and international organisations (SPREP, IUCN, UNDP, USAID, WWF) took part in the event. The German Parliamentary State Secretary was also present.

3.4 Assessing the impacts

For the purpose of this study impacts refer to medium and long term changes within partner organisations. Although these are not linked by a cause-effect relationship to the P3DM processes, there is evidence that CTA-led activities in the domain of P3DM contributed to these positive changes.

3.4.1 Mobilising funding and acquiring service contracts

To date **PwM** has been able to mobilize around 247,000 Euros for developing P3DM as part of its sustainable natural resource management projects in Papua New Guinea and the Pacific. Funding organisations include the World Bank, TNC, Madang Provincial Government, Australian Agency for International Development (AusAID), United Nations Development Programme (UNDP) /Samoa and UNDP/EDC-PNG. Internal costs (that is salaries and travels) have been covered by Rainforest Foundation Norway. PwM staff was hired by TNC, the Government of Samoa and CTA for facilitating P3DM exercises in Papua New Guinea²⁹, Samoa and Trinidad and Tobago respectively. Before 2005, PwM had only a few partners: local NGOs, Education Development Center Inc. in USA, and AusAID. After being exposed to P3DM practice in 2005 and having benefitted from CTA networking support, the number of partners rocketed and PwM now works with nineteen different partners³⁰ around the world.

In **Samoa**, during the inception phase of the ICCRIFS project the budget for outcome 3 “Project knowledge captured, analysed and disseminated” was doubled, especially due to the cost of introducing P3DM (mostly for international consultancies). However, it is fair to conclude that the benefits of introducing P3DM in the project significantly outweighed its cost³¹. This contributed to meeting the co-financing requirement under the GEF. The buy-in of the MNRE was an important achievement, with the Ministry financing up to fifty per cent of P3DM-related activities. The other Ministries and Divisions involved in replication are using budgets different from the ICCRIFS project. Also EU funds were mobilized for P3DM. Along with UNDP also FAO mobilized GEF funds to implement P3DM in partnership with the technical team of the Forestry Division.

As of the writing of this report, The UNDP GEF-SGP national coordinating offices in Fiji and Solomon islands are reviewing project proposals all having a P3DM component. In the last few years, GEF-SGP has been supporting a range of projects including P3DM processes in SIDS.

²⁹ PwM obtained three service contracts with TNC covering Madang, Onaketo and Manus in Papua New Guinea.

³⁰ Asia Forum on Forest and Development (APFED), DOEN Foundation, Global Green Grant Fund (GGF), Government of Samoa-MNRE, ICCO in The Netherlands, IUCN-NL, IUCN- Oceania, James Cook University, TNC-Australia, TNC-PNG, TNC-Solomon Islands, CTA, UNEP, UNDP, University of South Pacific, University of Hawaii on Manoa, World Bank, WWF-Australia, WWF-PNG.

³¹ The average cost in Samoa for a regular 10-day workshop is 25,000 Euros (73,000 WST) excluding the cost of material. In Lake Lanoto'o the cost was halved because the workshop was conducted over a period of 6 days only. In Lauli'i to Falevao an extra 20,000 Euros were spent for consultancy fee for PwM (60,000 WST).

3.4.2 Contribution to sustainable spatial planning and climate change adaptation

In all assessed initiatives, the PGIS/P3DM outputs³² have been used to influence and contribute to sustainable spatial planning and management, which are now based on enhanced knowledge and analytical capacity. P3DM demonstrated to be an excellent tool for discussing resource management and identify problems' root causes and their solutions.

“With the model we could know what places to develop, not all places are for development. We can point out where to mark areas that can be reserved (e.g. forest reserves), areas for planting, building houses also our qoliqoli.”
(Mesake Draniatu, Ovalau, Fiji; pers.comm.)

In Fiji, in July 2005 some of the partners involved in the P3DM led by the FLMMA brought together 135 representatives from all island's villages for a period of five days to conduct a visioning and planning workshop. Using the 3D model as a visual and tactile reference, villagers divided in groups conducted transect walks (i.e. mental itineraries). Using a wooden stick, leaders simulated the walk, pointing at and naming different habitats and relevant species found there, and describing their status, opportunities and threats. Taking stock of

these scenarios, participants decided to collaborate to an island-wide Management Plan or a Vanua³³ ko Ovalau Resource Management and Action Plan. Many other community meetings took place as part of the wider plan of activities that FLMMA organised on the island. According to the interviewees P3DM was crucial to and paved the way to the following which occurred without CTA financial or technical support:

- A holistic approach to spatial planning. Previous plans looked solely at infrastructure. Six months after the P3DM the community prepared an island-wide management plan using the model as a reference.
- Development of 27 village resource management plans, and District level plans. There was no resource management Plan before the 3D mapping exercise was conducted. One staff from FLMMA, who was part of the P3DM, facilitated resource management planning for his District and was responsible for liaising with representatives from other districts.
- Establishment of 12 Locally-Managed Marine Areas (LMMAs) for implementing sustainable fishing management strategies. Locally Managed Marine Areas (LMMAs) in Ovalau include 8 tabu areas³⁴, periodically harvest closures (PHC)³⁵, and rotational closures. LMMAs are set up with the objective to restore marine life and fish stock. The people of Ovalau did not have any LMMA before the P3DM. They identified these areas on the model backstopped by FLMMA which facilitated follow-up planning. The implementation of the coastal resource management plan led to an increase in the fish stock.

³² For example, geo-referenced data, video productions, maps, geocoded imaged and related narratives, etc.

³³ For Fijians, 'vanua' refers to the peoples, the land, the sea and everything they contain. For more information see Rambaldi et al. 2006 *Resource use, development planning, and safeguarding intangible cultural heritage: lessons from Fiji Islands* in IIED Participatory Learning and Action (PLA 54).

³⁴ No-take zones or permanent closure with the same characteristics of Marine Protected Areas (MPAs). In Fiji there is no legal framework for implementing MPAs, therefore the term tabu (tambou) is preferred in this context. Also the term 'LMMAs' suggests that traditional management practices are valuable tools.

³⁵ Periodically harvested closures (PHC) are no take reefs that are only opened on certain occasion determined by the chief and his committee. These are usually opened for a very short period of time (few hours to a few days) for a very specific purpose (e.g. wedding, death of a chief) and then they are closed again.

- Establishment of *yaubula* (natural resources) committees³⁶. Whereas village committees for health, education and infrastructure already existed, there was no *yaubula* committee. After the P3DM exercise took place *yaubula* committees were established in order to enforce and monitor the implementation of the natural resource management plans.
- Set a baseline for natural resource management and development planning. Through model making villagers became aware of how their land and seascapes looked like. People who never flew on a plane or had the chance to have a look at Google Earth or similar, do not have the benefit of having a birds-eye-view of their territory. The 3D model exposed them to that view and broadened their understanding of the land and seascapes of their island. Any change in the landscape or in the coastline became more evident because they could compare these with the 3D model done in 2005

“The model helped to see that they have very steep lands where they were farming at times, different class of lands where they are not allowed to farm. In the model they decided in which areas they could farm, where they couldn’t and where they cannot cut trees”. (Alifereti Tawake, pers.comm.)

Through the analysis of the 3D model they realised that Ovalau has relatively small fishing grounds whereas there was a great potential for agricultural development. Some areas were replanted or allocated to agricultural production (e.g. with coconut trees, taro). Agricultural productivity on the island significantly increased since then. After the model-making there was an indication from the High Chief to stop slash and burn for preparing agricultural land. He was a highly respected Chief and this helped in the implementation of the proposed management plans (Silika Tuivanuavou, pers. comm.). The Ovalau P3DM process provided communities with a platform around which they could get organized. It enhanced awareness of climate change and natural resources management in partner organisations. Changed attitudes towards good stewardship were noticed in FLMMA Network, WWF, Wildlife Conservation Society, Partners in Community Development Fiji and Institute of Applied Science-University of South Pacific.

In Manus in **PNG**, PwM has been using the model to engage with the local communities and foster discussion on sensitive developments (poaching, logging, and especially mining). After overlaying a mining concession on their 3D model, participants were shocked and communities from the coastal areas started to put pressure on the local and provincial governments to revoke the license.

In the **Solomon Islands**, the P3DM emphasized the key role of forests, mangroves and reef conservation in strengthening community resilience. The clear visualisation of customary boundaries in Chivoko reinforced the community’s legal claims against the granting of a logging concession. The women in Boe Boe said they had already noticed a significant depletion of natural resources. Due to rising sea levels, they had to harvest edible shellfish in more remote locations. Villagers realised that the need to relocate and rethink their economic activities was inevitable.³⁷ In Boe Boe the model initially planned for adaptation to climate change also helped raise awareness on a proposed mining project. The feeling of ownership and empowerment generated through the P3DM process helped villagers voicing out their concerns and secured the complete excision of areas they identified as culturally and environmentally important from the mining concession³⁸.

Most of those who attended the construction [of the model] learnt more and they can work towards changing their attitudes. They were polluting the rivers. One of the man said this is where I planted

³⁶ Chiefs have to consult *yaubula* committees when they want to open a closed reef, for example.

³⁷ Piccolella, A. Hardcastle, J. Kereseke, J. 2013, *The multifaceted impacts of P3DM: experiences from the Solomon Islands* in IIED Participatory Learning and Action (PLA 66).

³⁸ *Ibid.*

taro and we told him the impact of cutting trees and planting just one crop, we explained eco-forestry of how he can plant taro and have trees around. We spoke about how they should do multi-cropping and mix plantation and leave native trees. Their attitude changed. I noticed from our monthly site visits the way they develop the land. (Lotomaulalo Levi, Watershed Section, MNRE, Samoa)

In **Samoa**, communities identified areas for conservation and forest rehabilitation³⁹. In Mauga o Salafai National Park, it was evident from the model that farming and grazing activities were encroaching on the National Park, covering at least one third of its area. With the support of the Disaster Management Office, the P3DM process raised awareness on environmental and climate-related risks and set the ground for identifying safe zones (beyond 60 meter altitude) and escape routes in case of tsunamis. In the village of Falefa, villagers noticed that the mangrove area had reduced severely (to less than one hectare) after the hurricane and this encouraged to protect the area. P3DM also helped thinking about alternative income-generating activities. In the village of Lalomalava, villagers decided to rehabilitate coconut trees, a key crop in Samoa culture that was no longer substantially contributing to their livelihoods. The information gathered on the model was used to plan for the Baseline Ecological Surveys⁴⁰ and to prepare community-based management plans and establish community-based conservation areas (CBCAs). In Lake Lanoto'o a management plan reflecting the need for climate change adaptation was prepared. P3DM proved to be of huge value to the project objectives of conscience building for climate-resilient sustainable land use management. Good progress has been made in the engagement of local communities and farmers in adaptive and new farming practices⁴¹. Resilience of local communities to climate change was enhanced as a result of these activities. In the Apia catchment area, P3DM was used to develop three watershed sub-catchment plans. It also assisted MNRE in developing the City Spatial Plan.

"When you do the talking and there is no visual, you see a lot of nodding 'yep yep we are going to do that'. You go one month later and there is nothing. But once they saw this model, once they looked at the model and saw the landscape and the way this was related to the water sources, they just automatically pinpointed it on the map. 'Oh we have a lot of plantations in this area. We have to remove this cattle. We see now where our water source is from. We have to conserve this area.' They have already taken action on that path and our role is providing assistance: provision of planting material as well as demonstrate how to plant the trees and how to do the spacing. And we do monitoring and maintenance. But actually once they saw this on the model they understood how critical it was. Most of them live in the coastal areas and the plantations and development they saw were unsustainable and potentially harmful for the village. (Luaiaufi Aiono, ICCRIFS Agroforestry Officer, Samoa)

In **Vanuatu**, the P3DM was used in June 2013 to facilitate the development of community-owned and consensual management and adaptation plans, and also to help the communities to better understand their island ecosystems. Participants identified climate change issues in their respective villages and communities, discussed coping mechanisms, and identified adaptation options to tackle the issues. The 3D model of Epi helped the participants to visualise and understand the

Members of the community who were not trained to interpret 2D maps and found these difficult, found the 3D model easy to understand. This improved understanding of geography, locations of natural resources, and linked ecosystems helps decision makers make more informed decisions on activities involving these resources and ecosystems. (PACC Technical Report N.10, 2014)

the community project promoters, set up eco-forestry demonstration plots and helps setting the nurseries.

⁴⁰ It gave a clearer sense of distance between places and informed a more realistic schedule for the survey.

⁴¹ ICCRIFS Mid-term Review, p.26.

complex relationship between terrestrial and marine ecosystems. At the end of the exercise, thirty-nine kilometres of road were identified by the residents as particularly vulnerable to weather and climate impacts. Village chiefs made resources (e.g. quarry materials) available for the improvement of infrastructure, including concrete surfacing of steep parts of the road, improved drainage, and relocating 5 km of the coastal road further inland. Epi's coastal airstrip, schools and some coastal villages were also moved inland, to protect these from sea level rise and extreme weather conditions.⁴² On 6 March 2015 Tropical Cyclone Pam, which is regarded as one of the worst natural disasters in the history of Vanuatu, struck the archipelago causing loss of life and extensive infrastructure damage. Contacted in the framework of this impact study, the Vanuatu Meteorology & Geo-hazards Department confirmed in May 2015 that on Epi Islands "*all roads are intact and continue to facilitate access*" (Brian Phillips, Manager, NAB Project Management Unit, Vanuatu, personal communication), proving that actions taken as a follow-up to the P3DM exercise had been effective in mitigating the impact of the cyclone.

Both in **Fiji**, **Samoa** and **Vanuatu** community-based committees were established to supervise and monitor the conservation areas and the adaptation plans. Committees play a liaison role with project staff.

3.4.3 Safeguarding and transmission of cultural heritage

In the Pacific a rich cultural heritage risks to get lost as younger generations are no longer taught about the story of their land and their traditional customs. P3DM has been used to revive precious traditional knowledge and create a platform for different generations to come together and learn from each other.

In **Fiji**, the model was used for environmental and cultural heritage education. Since its proclamation as a UNESCO World Heritage Site (WHS), visiting Levuka has become part of the educational curriculum. Schools from the area of Suva come and visit the model and the Museum where it is stored. The National Trust is responsible for conducting the historical walking tour of the town for both students and tourists. The Community centre/Museum is the starting point of the tour; this is where the introduction to Levuka and Ovalau takes place with reference to the 3D model. The model is used to give an overview of the island and anticipate what they will be visiting. In 2014, 2,163 students visited the museum (National Trust of Fiji Database).

Elizabeth Newton from the National Trust of Fiji – who took part in the Ovalau mapping exercise in 2005 – has been using the printed pictures of the 3D model for environmental education in Ovalau since 2007. Even before the P3DM was done she used to go and visit rural schools on the island to teach about the environment, history and heritage. The model, with its 79 layers of information, has provided a precious visual support to these lessons. Students are encouraged to go and visit the model in person at the Community Centre. She also used these pictures with the students of Sigatoka Sand Dunes in Viti Levu, which is another National Trust site.

The P3DM process played an important role in the process of including Levuka Historical Port Town in the UNESCO WHS List. The communities of Ovalau got involved "hands-on" in a process adding value to traditional knowledge and aimed at documenting both their tangible and intangible heritage. This raised awareness and set the ground for further community mobilisation around these themes. Community participation was crucial to prepare the nomination document necessary for the submission to UNESCO. The model showed the existence of several layers of history, knowledge, and culture going beyond the colonial legacy. Details of this story are illustrated in Annex 3 on page 41.

⁴² SPREP. *Enhancing resilience of coastal infrastructure and community assets*. Available at: <http://www.sprep.org/pacc/vanuatu>

Box 2 Reviving the history of the island: the crucial importance of Lovoni tribe

Most of the interviewees remembered that the model-making brought back memories of the importance of Lovoni people in the history of the island. They remembered their strategic military superiority and how they established kinship relationships with the neighbouring villages down the coast through marriage. This type of information was included in the supporting documentation submitted to UNESCO for World Heritage Listing. An excerpt of that story is reported below:

“Intermittent raids however, usually disrupted peace in the new settlement. This was carried out by the hostile tribes of Lovoni who claimed to be the original settlers of Ovalau and also laid claim to the land upon which Levuka town sat (Young, 1984). One such raid occurred in November 1840, where Lovoni warriors raided the settlement in Levuka and took back with them nine women. Again, the following July, they came down at night and set fire to the houses and stores and looted freely in the commotion that ensued. Great losses incurred as the result of actions undertaken by Lovoni tribes includes loss of buildings and merchandise that is scarce given the infrequent visit of overseas vessels (Derrick, 1946). [...] Of the three chiefdoms on Ovalau, only Lovoni remained, an independent kingdom with six subject villages” (Nomination File submitted to UNESCO p.71 and 74).

The importance of the P3DM process in safeguarding ever-evolving intangible cultural heritage in Ovalau Island was confirmed by the issuance of the awarding of the 2007 World Summit Award (WSA) in the category e-culture as described more in detail Box 1.

Also in **Samoa**, P3DM has already been used as an educational medium. Lauili'i Primary school requested the assistance of the Forestry Division for building a model for the National Science Fair. St. Mary School did the same for their own school Fair and covered the Vaitele village, the venue for the Third International Conference of SIDS (September, 2014). Also the Fiamalamalama School for students with disability prepared a model for the National Science Fair “living with climate change” to raise students' awareness on climate change and climate change adaptation issues, as well as disaster risk reduction. Because of the work already carried out with schools, geo-spatial information methods are likely to be included in the School curriculums. There is a lot of interest in P3DM for youth climate change and environmental education. Furthermore, it has to be noted that a rich body of ancient customs and traditional stories emerged during the P3DM exercises.

Box 3 Discovering Samoan customs and traditional stories

In Lake Lanoto'o, villagers remembered that they had a road just past the lake along which they used to carry the bodies of dead people from the hospital to the village of origin upland. The bodies used to be carried on mats. “At the time people did not have vehicles and had to walk in the forest,” states Luaiufi Aiono, ICCRIFS Agroforestry officer. On the model they showed the location of the trees where they used to hang the bodies⁴³ overnight, as a sign of tradition and respect, and to avoid animals from eating them.

In the model from Lauili'i to Falevao, they identified a peak that, according to the ancestors, is inhabited by a spirit. In the underneath cave it is possible to find corals, shells, shrimp cases (unusual items to be found so far from the coast). According to local stories these would be the leftover from the meals of the spirit that dwells the cave. Nobody really knows why these marine objects are found in a cave upland. All they know is a story that connects them to their roots and is vital for identity building for the younger generations. It is interesting to note that villagers are aware that this cultural heritage is of interest not only in the country but has a universal cultural value and could therefore be used to attract tourism. They also raised the issue of how to make this site accessible as there is no road.

In **PNG**, during the tribal days people used to move from place to place but when the elders died they used to bury them in their village of origin. These are considered sacred sites. Although burial grounds are not visualized on the community model, the P3DM processes provided an opportunity for reviving those stories and traditions.

⁴³ Probably the body used to be hang in a hammock shape.

In **Australia**, Government policies had resulted in a disconnection of Aboriginal Peoples from their rich cultural heritage. Traditional language was getting lost and they lacked a process for transmitting their traditional knowledge in a culturally compatible way. The P3DM project brought Mandingalbay Yidinji people together, encouraged them to share stories about their country and people, and most importantly to educate the youth. They identified indigenous protected areas, cultural walking tracks, and story trails that connect them to the people of Cape York up to PNG and further north.

3.4.4 Influencing policy-making

In **Samoa**, after the P3DM workshop, villagers were better positioned to influence decision-making at the Ministry level. The P3DM process provided a grassroots contribution to the new Forestry Policy⁴⁴ which integrates climate change into forestry management. During the ecological survey the communities were better positioned to say what they have and what their issues are. The model for the Apia Catchment was used to complete the Upland Watershed Management Policy and some water tower policies. According to the ICCRIFS Project Mid-Term Review “the project is for the moment one of the most successful that is implemented in Samoa in the area of environment and natural resources management⁴⁵”. The P3DM has made an invaluable contribution to such a result and is regarded as a best practice. P3DM has achieved great interest at national level. It is already being used for planning in agriculture and health, often with advice from ICCRIFS⁴⁶. The P3DM allowed a bidirectional flow of information. This helped overcoming the lecturing style of some development projects where communities are only passive recipients and allowed project personal and government authorities to gather valuable knowledge to inform land-use policy-making.

In **PNG**, in both 2013 and 2014 PwM has been invited by the Consultative Implementation and Monitoring Council (CIMC)⁴⁷ to present on P3DM at the Regional Development Forum. There is a potential for the Department of National Planning to adopt this process for rural development planning.

3.4.5 Other environmental and socio-economic impacts

In the Pacific, there have been several interesting developments indirectly related to P3DM.

In **Fiji** after the proclamation of Levuka Town World Heritage Site there has been an increase in tourism. “We saw an increase in the number of visitors to the island. This has been expressed by everybody from taxi drivers to owners of hotel and restaurants” stated Anaseini Kalougata from the Department of National Heritage, Culture and Arts. “That’s money to the local, for the economy”. Many investors restored old buildings in Levuka town, revived business and created employment for local people. The number of hostels increased from two to five. The locals have also found employment producing crafts or working as tour guides. Some villages organise day-tour programmes. As for 2014, the total number of visitors (both international and local) that visited the Museum is 1,199 (National Trust of Fiji Database). Before the proclamation there were not more than 10 visitors per month. Since the Museum is a must for visitors, this number provides a good indication of the number of tourists to the island.

⁴⁴ The draft policy document mentions the valuable contribution of P3DM and suggests using the process to monitor effective forestry management.

⁴⁵ ICCRIFS Quarterly Progress Report April – June 2014, Integration of climate change to forest management in Samoa ICCRIFS – Project Management Report Series (p. 8, 45, 55, 63 and 65).

⁴⁶ ICCRIFS Mid-term Review, p.45.

⁴⁷ CIMC is an independent organisation that brings together civil society, private sector and government partners to develop policy and directly influence and monitor government decision making for the long term development of Papua New Guinea. More info available at: <http://www.inapng.com/cimc/>.

The government made important investment in infrastructure and safety (e.g. ensuring the maintenance of trails, roads, providing hydrants or fire detectors in the buildings). There is recognition at the national government level and intention to maintain Levuka in good condition and protect the heritage site. Significant funding has been provided to this end.

The P3DM process contributed to the decision of the Pacific Fishing Company (PAFCO)⁴⁸ to improve waste disposal and comply with environment law. Pollution from the cannery – which is a serious issue on the island – was one of the topics discussed during the planning workshops which followed the making of the model.

“Ovalau has been highlighted in the last two years as the most productive island in terms of agriculture in Fiji. The starting point of all this is the mapping exercise because it really helped the people realise they don’t have much fishing grounds, compared to the rest of Fiji. [...] It helped youth organise around farming.[...] For them the light-bulb turned on. They were not only able to talk among themselves but also with the neighbouring villages and districts. They see what we have, basically look at their common assets. This initiated the dialogue, the future planning.” (Alifereti Tawake, Fiji, pers.comm.)

In **Samoa**, P3DM had an impact on the private sector. Whereas initially the cardboards were imported from New Zealand, the growth of demand persuaded a local company to produce locally the type of cardboards requested for developing 3Dimensional Models of this kind. Along with creating an economic spin-off, having cardboards right available in Samoa decreased the cost of P3DM in the country.

Through the model they also identified areas they would like to develop for tourism purposes. Although impact on tourism, school curriculums and infrastructure development has not occurred yet, this gives an idea of impacts to come. It is important to observe that the models in Samoa are still relatively recent and achievements to date suggest that longer term impacts will follow.

3.4.6 Using Participatory 3D Modelling as indicator of project success

The beneficial impact of the introduction of P3DM in the ICCRIFS project in **Samoa** is the leitmotiv of the ICCRIFS Mid-Term Review, conducted by an independent consultant. P3DM is mentioned forty-seven times. The Consultant regards P3DM as a best practice because of its capacity to *“improve local ownership, let the village population understand the problematic around natural resource management with a watershed approach, and most of all assuring their participation in sustainable land use planning”* and recommends to export P3DM in other parts of the world through other projects. The Project was supposed to be concluded in 2015 and duration was extended to 2016. Indeed P3DM contributed to all of the three ICCRIFS project components: i) Policy, ii) Implementation of agroforestry practices and rehabilitation, and iii) Communication, with special reference to the last two. The project is also updating SamFRIS (Samoa Forest Resource Information System) and in doing so they put P3DM as indicator of performance. The method is also mentioned in the Annual report submitted by the MNRE to the Parliament and according to which the annual performance of the Ministry is assessed (Annual Report FY 2012-2013, p.16).

3.5 Summary of findings

CTA support to the introduction, adoption and replication of participatory ICTs for improving spatial planning and natural resources management in the Pacific has contributed to all of the three expected results mentioned in the introduction.

⁴⁸ Working at PAFCO is the main livelihood for people on the island.

3.5.1 R1: Best practices in the use of PGIS (and related web 2.0 applications) and lessons learnt are well documented, widely disseminated and adopted in bottom-up planning and advocacy processes by selected national and regional bodies.

The work done in **Fiji** was duly documented and lessons learnt shared through video production, articles, blogs and at regional and international events. Receiving the World Summit Award as a best practice of E-content significantly raised the profile of P3DM internationally. Adoption was selective. One of the fifteen involved organisations, Partners with Melanesians, mainstreamed the methodology in its operations and other two participants contributed to the adoption of the methodology within their organisations (TNC in PNG and Solomon Islands, and the Wet Tropics Management Authority in Australia). The role played by PwM in spreading P3DM in the Pacific and later introducing it in the Caribbean has been invaluable and triggered positive results in many countries. There are several reasons beyond the lack of adoption in Fiji. The main implementing institution, that is the FLMMA Network, at that stage in time was newly constituted and was not ready, under the organisational perspective, to carry forward such a process. Funding was an issue for all the involved organisations. The main obstacle, however, seems to have been a change in responsibility and positions of staff. Some of the key participants (GIS experts involved in the production of baselines and digitisation process and the Communication Officer in charge of documenting the process) are no longer in work. Most of the people responsible for carrying out follow-up work had not been involved in the P3DM workshop itself and could not appreciate the full potential of the tool. Finally, the decision to store the model in the Provincial Office proved to be inadequate. For the first two years the model was not accessible to the public⁴⁹ and could not be used for educational purposes, environmental awareness and tourism. These are the main factors which hampered the replication of P3DM process in Fiji. Nonetheless, it has been noted that even when the process itself has not been replicated, the lessons learnt from the 2005 workshop have been internalized by participants. All the interviewees fully understood the value added of participation in planning and advocacy process and applied the code of ethics and the new facilitation skills in their work.

At present several project proposals including a P3DM component are being assessed by the national committees responsible for approving GEF-SGP funding in Fiji and Solomon Islands.

The widespread adoption of P3DM in **Samoa** – both within the MNRE and by different Ministries as well as the uptake from different international and regional organisations – suggests the potential for institutionalization⁵⁰ of P3DM in the country. In three years sixteen modelling exercises were completed, others are in the pipeline and plans for other two (island-wide P3DM for Savaii and Upolu) were proposed. Replication of P3DM in projects with other funding sources is also a sign of progressive nation-wide institutionalization. The political environment in Samoa was particularly favourable to the success of P3DM. The government was already working with communities to implement development projects. MNRE staff was heavily involved right from the beginning, has been closely working with project staff, and has succeeded to establish a relationship of trust with communities. This suggests the sustainability of project interventions beyond the project life span. When development projects will phase out the MNRE will come in and take care of the models.

⁴⁹ Initially stored in the Provincial Office, the model was later taken by National Trust of Fiji which restored it, where possible, and displayed in the Community Centre which hosts a Museum and Library. The National Trust is willing to fully restore the model and use it for engaging communities in updating the management plans.

⁵⁰ Institutionalisation refers to the process of embedding something (in this case a process and method) within an organisation, social system, or society as a whole.

From the community perspective every village has a champion (often the Chair of the Project) and this will take care of the follow up after the project is over. The communication and knowledge management component of P3DM in Samoa was also very successful. Having a Communication and Knowledge Management Officer as a champion of the method has certainly contributed to positive results. The successful introduction of P3DM was extensively documented on the media and shared in very important international forums (i.e. third UN International Conference on SIDS, the sixth IUCN World Parks Congress). The ICCRIFS Project Mid Term Review offers an invaluable source of information on the impact of P3DM on the project.

As well highlighted in the PACC Technical Report N.10 in **Vanuatu** “the use of P3DM was very effective for collecting and capturing local knowledge. At the same time it provided an excellent opportunity to verify the local information collected [...]. The tool enhanced the community consultation [...].” Follow-up actions resulted in a positive impact in terms of mitigation from natural disasters as described in section 3.4.2 on page 27.

3.5.2 R2: Staff from selected regional and national organisations are competent in using the PGIS practice and Web 2.0 applications in relation to climate change adaptation in SIDS.

TNC implemented the first P3DM project specifically aimed at planning for climate change adaptation in 2011 in the **Solomon Islands**. Although TNC staff took part in the mapping in Ovalau, **Fiji**, such an application is not directly linked to that experience. CTA started promoting the use of P3DM for adaptation to climate change only in 2012. Nonetheless, the model in Ovalau provided a baseline for villagers. Since the P3DM experience enhanced the awareness of how their island looked like they can now better appreciate the changes occurred (sea level rise, damage to mangroves and reefs, reduced water availability, soil erosion) and take decisions on how to cope with these changes.

In **Samoa**, one of the most significant results of P3DM is the fruitful replication of the Training of Trainers (ToT) component. One is really competent in doing something when is able to explain it to somebody else. Key stakeholders were invited to participate in each P3DM exercise precisely with the purpose of being trained in P3DM and adopting the method elsewhere. The immediate uptake from the Water Division as well as the involvement of the Disaster Management Office was a remarkable result.

The P3DM process and related activities (replanting, agro-forestry demonstration plots) increased the resilience and adaptive capacity of Samoa’s forest areas and dependent communities to the threats of climate change. Started in a project aimed at mainstreaming climate change considerations into forestry, staff from MNRE used the P3DM for highlighting several other climate change and disaster-related vulnerabilities. It helped to identify safe zones and escape routes in case of tsunamis, soil erosion and areas at risk of flooding. Generally the process nurtured conscience building and provided a longer-term perspective on land-use decision-making.

In **Vanuatu**, through the 2013 P3DM workshop, the PACC project team, using the 3D map, supported participants in identifying, recording and mapping out the climate change problems and solutions (coping strategies) in the different areas of Epi Island. Resident communities took ownership of the outcomes of the process, mobilised resources and supported the implementation of identified solutions. As described in section 3.4.2 on page 27 this resulted in averting damages during the March 2015 tropical Cyclone Pam.

UNDP-funded ‘Strengthening the resilience of our islands and our communities to climate change (SRIC-CC)’ project in **Cook Islands** has shown interest in using P3DM for adaptation planning in Mangaia Island.

3.5.3 R3: Regional centres of excellence in participatory spatial information and communication are established in each of the two regions

In **PNG**, PwM mainstreamed the methodology in its work and has become a Centre of excellence in the Pacific. P3DM has become one of the core methods used by PwM to promote sustainable natural resource management. The adoption of P3DM has inevitably influenced the work of the organisation and the daily tasks of its staff. PwM has been rewarded in terms of both reputation, work opportunities, funding and opportunities for learning and growing. PwM has been playing a pivotal role in the spread of P3DM in the world and in sharing lessons learnt. It has benefited from a long-term relationship of trust and reciprocal respect with CTA.

In **Samoa**, beyond expectations the team composed by the ICCRIFS project staff and the MNRE staff represents a centre of excellence in participatory spatial information and communication. The requests of support coming from Tonga, American Samoa and more recently Cook Islands, as well as the interest of a multitude of projects and organisations in their work suggests that this staff has become a reference point. However, since the staff is linked to a National Ministry this role will not overlap with that played by PwM (independent service provider) but will rather create new avenues for expanding the use of P3DM in the region. For example, this could trigger a series of government to government South-South cooperation initiatives in the Pacific.

4 CONCLUSIONS

It is possible to conclude that the interventions of CTA aimed at the introduction, adoption and replication of P3DM in the Pacific delivered significant positive results in line with the framework chosen for this assessment. All expected outputs, outcomes and objectives were met⁵¹. The occurrence of unintended positive impacts confirms the open-ended nature of P3DM and its appropriateness to bottom-up processes. Nonetheless, it is not possible to generalize on results and each country experience deserves separate considerations.

In **Fiji**, the P3DM delivered significant immediate positive results. The P3DM project introduced, showcased and documented improved spatial information and communication management practices in the context of community-based spatial planning. It improved community-mapping skills among selected practitioners in the South Pacific Region and lessons learnt from this experience were widely shared. Resource Management Plans and Locally Managed Marine areas were established for the first time. The process fostered community mobilization around environmental and resources management problems and the importance of heritage. This helped villagers get organised to capitalise on the use of their resources. Having follow-up activities coordinated by people who were not part of the model-making (i.e. lack of continuity) was the greatest limitation. In the long term there was a change in the role played by the model. It shifted from being a participatory planning tool to becoming an important repository of information for educational purposes. Despite its maintenance has not been adequate⁵², the 3D model has been kept alive throughout the years, it is now stored in an appropriate location and there is a strong interest from National Trust of Fiji in restoring the model and reviving its use for planning purposes.

In **Papua New Guinea**, results were quite diverse. The TNC-supported Almami P3DM in the Madang Province⁵³, initially left in an open space, overlooked and subject to deterioration, was later moved in a safe storage. The follow-up and monitoring role played by PwM was key to identify and solve this issue. In selected cases, such as this one, the process did not succeed in building ownership. If people do not 'own' the model (are not empowered throughout the process) they cannot be good custodians. The WB-funded model of the Managalas Plateau provides evidence of the opposite case. The process of working with P3DM stimulated discussion and finally generated consensus around the proposed boundary for the conservation area. The model is currently being used. The fact that the model is made for one of the PwM project area certainly helped in this. It is harder for P3DM facilitators to ensure continuity in use when they are not directly involved in wider projects in the area. For this reason, a trusted implementing agency with a long term relationship with local communities should always be involved.

The experiences in the **Solomon Islands** confirm the capacity of P3DM for generating results beyond project expectations. How the model is used is determined throughout the participatory process and is adjusted as community needs evolve. So while the model projected the impacts of logging (in Chivoko) and climate change (in Boe Boe) in line with project objectives, it also generated several unintended positive outcomes: discussing alternative livelihood strategies, giving a voice to women, transmitting traditional knowledge to younger generations, putting villagers in a position to advocate for their rights on natural resources. The facilitation team demonstrated respect and cultural sensitivity throughout, and the leadership and intermediary role of a trusted local organisation (Land Lauru

⁵¹ In relation to both Project *Promoting participatory ICTs for adding value to traditional knowledge in climate change adaptation, advocacy and policy processes in the Pacific and Caribbean* (2012) and *Collaborative Spatial Information and Communication Management in the Pacific* (2005).

⁵² Many labels are no longer readable, the grid is no longer in place, and the legend went lost.

⁵³ The model had been satisfactorily used to achieve project objectives: to identify customary land owners in the area to seek permission for conducting carbon stock assessments.

Conference of Tribal Community) and the endorsement of the village chiefs paved the way for a fruitful community engagement⁵⁴.

In **Samoa**, the endorsement of the Ministry of Natural Resources and Environment was instrumental for widespread up-scaling. The Ministry found in P3DM a useful tool to establish a constructive dialogue and work together with the local communities and its governmental partners. The effective replication of the ToT was the engine of P3DM in Samoa. Keeping an inclusive attitude with the constant availability of the project team in assisting and sharing knowledge with colleagues was key. The fact that the government was already working with communities provided an enabling environment for P3DM. The stunning results of Samoa suggests that when government is willing to genuinely work with communities, ministries and government agencies are best positioned to ensure solidity, continuity and mainstreaming of the process.

In **Vanuatu**, the PACC project team created a 3D model without technical assistance, simply on the basis of what they learnt in the Honiara workshop and the available training material. This confirms P3DM being a user friendly method that any community could implement to visualise traditional environmental knowledge, land-use issues and plan for solutions. The model confirmed its potential for building consensus. The workshop participants recognized the benefits of coastal infrastructure works for the entire community and put their resources and land at disposal free of charge.

The two phases of CTA PGIS/P3DM interventions in the Pacific are strictly linked. The 2012 Orientation and Planning workshop in Honiara provided a bridge between the first generation of 3D models in the Pacific and those of the second phase. Experiences and lessons learnt were shared in a thorough 5-day workshop seeing the involvement of a wide range of stakeholders from common villagers to chiefs, government agencies' staff and delegates from international organisations. The expertise of Partners with Melanesians combined with CTA remote assistance nurtured both phases. The targeting of participants for the Honiara workshop was very effective. Through the PACC projects, UNDP mobilized participants from Samoa, Cook Islands, Palau, Vanuatu and Solomon Islands. All of these countries have either replicated the method or are planning to do so (i.e. Cook Islands). It seems that 'return on investment' was rather high considering the limited financial investment of CTA (around 72,000 Euros).

The lesson sharing event held in November 2014 at the IUCN World Park Congress reinvigorated interest in P3DM with numerous requests of support, especially for up-scaling P3DM in Fiji. This suggests that the right conditions are in place for launching a third phase of P3DM in the Pacific bearing in mind that the CTA PGIS team should be expanded in order to address the number of requests and initiatives in the pipeline.

It seems evident that the 2014-2016 project **MP3.1 'Enhancing Institutional and Grassroots ICT Capacity to Influence Agricultural and Rural development Processes and Value Chain development'** and specifically its Sub-project **MP3.1.2 'Participatory Spatial Information Management and Communication for Empowering Grassroots in Climate Change Adaptation, Advocacy and Policy Processes'** fit within the goal of the 2015-2017 Regional Business Plan (RBP). The last section presents some recommendations for CTA to capitalise on lessons learnt and follow up on requests from partner organizations.

⁵⁴ Piccolella, A. Hardcastle, J. Kereseka, J. 2013, *The multifaceted impacts of P3DM: experiences from the Solomon Islands* in IIED Participatory Learning and Action (PLA 66).

5 RECOMMENDATIONS

1. **Need to ensure that data are captured, digitized, stored and analysed.** Without digitisation there is a risk that data gets lost following physical deterioration of 3D models. Only by importing data in GIS is possible to bridge scientific information with community generated information. Digitised maps are functional to monitoring changes over time.
2. **Need to ensure that 3D models and digital data sets are permanently accessible to knowledge holders (i.e. the contributing communities).** Public places such as community centres in the village seem particularly suitable to this end.
3. **Need to increase human resources at CTA dealing with PGIS projects.** Because of huge interest in the Region significant time is needed to liaise with a diversity of partners, organising events⁵⁵, remotely coaching, documenting and monitoring PGIS activities.
4. **Need to align CTA action with key priorities of national governments and regional organizations in the Pacific in the framework of the RBPs.** The SAMOA Pathway⁵⁶ (2014) has highlighted key challenges linked to climate change, water management, oceans and seas, disaster risk reduction, sustainable production and consumption of food as well as isolation. PGIS/P3DM in the region provides a comprehensive platform where all of these themes and more can be dealt with.

5.1.1 Funding and partnership opportunities

Although the cost of PGIS/P3DM activities is relatively low for the standards of development agencies, the main obstacle to replication for Pacific Island Countries remains availability of funding. The GEF has already funded several mapping exercises in the Pacific through UNDP projects. The satisfaction and appreciation of GEF and UNDP as well as the enthusiastic support received by national governments (especially in Samoa and Vanuatu) suggests that more agencies will come on board and finance these activities in the Region.

The International Fund for Agricultural Development (IFAD) represents an excellent partner in the region. IFAD is currently designing an [Adaptation for Smallholder Agriculture Programme \(ASAP\)](#) grant (USD 3 Million) for the Pacific. ASAP channels climate finance to smallholder farmers so they can access the information tools and technologies that help building their resilience to climate change. ASAP has become the largest global financing source dedicated to supporting the adaptation of poor smallholder farmers to climate change. The programme is working in more than thirty developing countries. ASAP can be either mainstreamed in wider projects or designed as a top up component.

Since Ciccia Island was proclaimed an Organic Island as a result of an IFAD project, there is potential for an ASAP top-up in this island. A new IFAD regional grant, started in January 2015, will also cover Cook Islands. Since the country has already shown interest in developing P3DM for adaptation planning IFAD could be interested in having participatory spatial planning as a component of its activities in the country.

The IFAD Environment and Climate Division, responsible for coordinating ASAP, has demonstrated keen interest in geographic information systems including participatory mapping. It has established a Geo-group which is an informal in-house community of

⁵⁵ Time difference with the Pacific presents specific challenges when organizing events.

⁵⁶ Outcome document adopted at the Third International Conference on Small Island Developing States (SIDS).

practice which brainstorms and provides feedback on how to best use GIS/PGIS to support its projects.

SPREP has shown interest in promoting the use of P3DM in the Pacific in several occasions. Three staff from SPREP took part in the Honiara workshop and SPREP is planning to support P3DM exercise both in Samoa⁵⁷ and Tonga. SPREP is the region's key inter-governmental organisation for environment and sustainable development, and is one of several inter-governmental agencies comprising the Council of Regional Organisations in the Pacific (CROP). It is therefore recommended to identify champions of P3DM in SPREP and strengthen partnership in view of future collaborations. The United States Agency for International Development (USAID) and New Zealand Agency for Development (NZAID) are also good potential partners in the region.

⁵⁷ They will work with UNDP to map the Tafitoala watershed.

6 ANNEXES

Annex 1 Case study: Reconnecting aboriginal people with their Country: the case of Mandingalbay Yidinji people

In October and November 2014 the Wet Tropics Management Authority facilitated a P3DM exercise with Mandingalbay Yidinji people – an Aboriginal clan from the rainforests of far north Queensland, Australia – using IUCN (UNDP GEF-SGP) funding and drawing on technical support from CTA. Later in November a small group of Mandingalbay Yidinji representatives took part in the World Parks Congress in Sydney and built a small replica of the bigger model with the aim of sharing their experience with the wider community of conservation and community development specialists. The idea of using P3DM with aboriginal people was introduced by M'Lis Flynn, Project Officer at Wet Tropics Management Authority, who was one of the trainees in the P3DM workshop in Ovalau Island in 2005.

The Mandingalbay Yidinji people live mostly in the Yarrabah community, one of Australia's largest Indigenous communities. In Yarrabah, 60% of the population are under 25 years of age, rates of high school completion are ¼ of the Queensland average, 45% are single parents and a huge 60% of people are unemployed. In 2006 after a long struggle, Mandingalbay Yidinji people were legally recognised as the rightful Traditional Owners of selected portions of their country (i.e. the area of land and sea to which they are traditionally connected). They worked hard to build processes and systems to ensure their recognition as leaders in looking after their own country. In 2011 the Mandingalbay Yidinji Aboriginal Corporation (MYAC) made history by declaring the first multi-tenured Indigenous Protected Area (IPA) in Australia. The Wet Tropics Management Authority envisaged that P3DM could serve the cause of Traditional Owners, whose culture is inseparable from their traditional land and seascapes. P3DM could help revive traditional knowledge, transmit it to younger generations, and advocate for land and natural resources rights recognition.

There was great interest in being part of the P3DM workshop in Queensland and they had to run a process for people to apply and be part of this initiative. Ten years ago working with aboriginal communities side by side in a relationship of peer-to-peer learning would have been unconceivable. Little work was done at the community level and the prevailing approach was top-down. Also aboriginal groups were more disorganised and probably lacked the confidence necessary to get involved. Australian Government policies had resulted in a disconnection of indigenous people from their rich cultural heritage. Traditional language was getting lost and they lacked a process for transmitting their traditional knowledge in a culturally compatible way.

The P3DM project brought Mandingalbay Yidinji people together, encouraged them to share stories about their country and people, and most importantly to educate the youth. On the 3D model they showed the different tenures in their Country: National Parks, State forest, Aboriginal free hold land, local government areas and the Great Barrier Reef Marine Park. They identified indigenous protected areas, cultural walking tracks, and story trails that connect them to the people of Cape York up to PNG and further north. They marked agricultural areas where they would like to have some economic development. The P3DM was the culmination of a process lasted twenty-three years. It assisted in bringing all facets of community together. The discussion generated by the P3DM will help delineating how they can actually engage with the management of the area and with the related national and local authorities. At the time of writing the Southern half of the model was yet to be completed and some champions within the group of participants that could co-facilitate the process with other interested Traditional Owners had already been identified.

Annex 2 Case study: Training of Trainers: the case of Partners with Melanesians

Since 2005 Partners with Melanesians, Inc. (PwM) – a small national NGO based in Papua New Guinea (PNG) – has been playing a pivotal role in the spread of P3DM in the Pacific. P3DM was chosen to engage local communities in Conservation projects and meeting the key requirement under the PNG Conservation Act of having a map of proposed conservation areas. Before the advent of P3DM, PwM used to collect waypoints with GPS to plot digital maps. However, the rough terrain, isolation of communities and adverse weather conditions made it difficult to go out in the forest and collect all the necessary waypoints within an acceptable timeframe. For this reason, the Executive Director of PwM, Kenn Mondiai, got interested in P3DM. He was part of a group of about 20 trainees – including members of government ministries, international NGOs, local community-based organisations, universities, and other national and regional institutions – who were trained in the historical town of Levuka on Ovalau Island in April 2005. The P3DM of Ovalau was meant to serve as a pilot intervention and concurrently as a training ground for practitioners in the Pacific. The case of PwM provides an excellent example of rapid adoption and widespread replication.

PwM has been working both in facilitation and training. It facilitated the building of seven 3D models in the Pacific (four in PNG⁵⁸, two in the Solomon Islands⁵⁹, one in Samoa⁶⁰) and one in the Caribbean⁶¹ providing capacity building for over 100 participants. To date PwM has been able to mobilize around 247,000 Euros⁶² in support of P3DM activities in the Pacific and receives plenty of requests of facilitation.

“For us, as an organization, we have improved a lot since 2005. Our name, our reputation and image is becoming more widely known and people are now looking at us as the people who has the skills and knowledge in 3D model and will facilitate the P3D model in PNG and the Pacific generally. CTA has done tremendous things in including us.” (Kenn Mondiai, Executive Director PwM)

Exposure to the international development community has contributed to building reputation and networks. PwM was not only involved in a P3DM mapping exercise in the Caribbean but shared its experience in International Conferences in Kenya (2006), Antigua (2012), Mauritius (2013), and Australia (2014)⁶³. Since 2005 PwM has been part of the virtual PPGIS network and Community of Practice actively following the discussion group and customising advices and hints to the PNG context. The 2014 Web 2.0 and Social Media training that was implemented by the National Agricultural Research Organisation (NARO) in PNG in partnership with CTA, has contributed to enhancing capacity in communication, knowledge management and networking. Before 2005, PwM had only a few partners: local NGOs in PNG, Education Development Center Inc. in USA, and AUSAid. After 2005, the number of partners rocketed and PwM now works with nineteen different partners⁶⁴ around the world.

⁵⁸ Managalas Plateau (2006-2007), Manus Island (2011), Almami, Madang (2013), Daulo, Eastern Highlands (2014).

⁵⁹ Boe Boe (2011), Naro village (2012).

⁶⁰ Laulii to Falevao, Upolu (2013).

⁶¹ Island of Tobago, Trinidad and Tobago (2012).

⁶² Funding organisations include the World Bank, The Nature Conservancy, Madang Provincial Government, AUSAid, UNDP/Samoa and UNDP/EDC-PNG. For accounting purposes we exclude Rainforest Foundation Norway which has been financing internal costs that is salaries and travels.

⁶³ Kenn Mondiai took part in the Mapping for Change Conference in 2006, to the 7th ACP Rural Development Briefing in Mauritius in 2011 and to the Sixth IUCN World Parks Congress 2014.

⁶⁴ Asia Forum on Forest and Development (APFED), DOEN Foundation, Global Green Grant Fund (GGF), Government of Samoa-MNRE, ICCO in The Netherlands, IUCN-NL, IUCN-Oceania, James Cook University, TNC-Australia, TNC-PNG, TNC-Solomon Islands, The Technical Center For

PwM has recently raised the interest also of government representatives in PNG, traditionally reluctant to work with NGOs. In both 2013 and 2014 PwM was invited by the Consultative Implementation and Monitoring Council (CIMC)⁶⁵ to present on P3DM at the Regional Development Forum. There is a potential for the Department of National Planning to adopt this process for rural development planning.

The achievements of PwM were possible because of strategic partnerships with CTA which has been mentoring its work on a regular basis, providing remote advice and in kind support, and the Nature Conservancy, a leading international NGO which was keen in incorporating P3DM in its projects in the region.

Agricultural and Rural Cooperation (CTA), UNEP, UNDP, University of South Pacific, University of Hawaii on Manoa, World Bank, WWF-Australia, WWF-PNG.

⁶⁵ CIMC is an independent organisation that brings together civil society, private sector and government partners to develop policy and directly influence and monitor government decision making for the long term development of Papua New Guinea. More info available at: <http://www.inapng.com/cimc/>.

Annex 3 Case study: Preserving and transmitting cultural and landscape heritage in Ovalau

In Ovalau, P3DM played an important role in including Levuka Historical Port Town in the UNESCO World Heritage List. The idea of registering Levuka on the World Heritage List dates back to the 1970s. In 1987, the Government of Fiji declared Levuka a Historic Port Town of both regional and national significance. However, when Levuka was gazetted as a historical town the local population had not fully understood the meaning of heritage and what that could imply for their socio-economic development. Starting in 1996 the Government of Fiji – through the activities of the National Trust, Fiji Museum and Department of National Heritage, Culture and Arts, and the Levuka town Council – focused on explaining the concept of World Heritage to the people of Ovalau and engaging them in the process of collecting information and evidence of its cultural value. The goal was to have Ovalau Island recognised as a UNESCO World Heritage Site (WHS) in order to protect its unique ecological and cultural heritage, and create new income-generating opportunities from tourism⁶⁶.

The various institutions involved in the process organised workshops, village meetings, school visits, publications, posters, and newsletters. Despite the efforts, effectively communicating the concept of cultural heritage was very difficult. Whereas the tangible heritage, the unique colonial architecture and urban structure, was visible to everyone, in contrast, eliciting and documenting the intangible bit of the heritage was a real challenge. Also it was difficult to show the link between World Heritage Listing and the sustainable development of the island as well as the safeguard of ecological and cultural landscapes for the benefit of future generations.

The idea that community mapping processes could help raise awareness and support the development of community-owned consensual management and development plans was not new in the early 2000s. At this time the Fiji National Trust had embraced participatory GIS techniques for data gathering and identifying what local elements could be considered as testimonials of cultural heritage⁶⁷. However, as highlighted in a paper by Margaret Purse, Professor at Sonoma State University, “the sheer intangibility of an electronic database makes the whole process seem transient, fugitive, and inconsequential, without linkages to real results, which people tend to define in terms of tangibility and public display”. An opportunity to overcome these challenges came in when Fiji Locally Managed Marine Area (FLMMA) Network in partnership with the Fiji-based WWF South Pacific Programme and with the support of National Trust of Fiji decided to work with the Technical Centre for Agricultural and Rural Cooperation (CTA)⁶⁸ to build a Participatory Three-Dimensional Model (P3DM) of Ovalau island.

In April 2005 a physical 3D model in card board was built in two weeks by close to 100 people from 27 villages who depicted their local spatial knowledge including land use and cover by the use of pushpins, yarns and paints. The younger generations were able to hear stories that only elders knew; others were able to reconnect the piecemeal information they had about the history and tradition of their land. The process of sharing knowledge, building identity and documenting a past hidden in memory was invaluable and it helped identify 83

⁶⁶ Levuka lacks the scenic beaches typical of many other places in Fiji and the primary attraction for Levuka is its colonial and pre-colonial cultural heritage management (Nomination dossier, 2012).

⁶⁷ Cultural mapping or landscaping was conducted as part of a UNESCO project, Levuka Cultural Landscape Programme.

⁶⁸ The Native Lands Trust Board (NLTB), the Development of Sustainable Agriculture in the Pacific (SPC-DSAP) Project and the Lomaiviti Provincial Council of the Ministry of Fijian Affairs and Provincial Development were also partners in this process.

places of cultural significance⁶⁹. The fact that all that knowledge was documented on one physical medium, publicly visible and tangible was a significant added value to the process.

When in July 2007, the then Director of the UNESCO World Heritage Centre, Dr Francesco Bandarin visited Levuka, he was impressed by the model and by the fact that the P3DM of Ovalau had just won the World Summit Award for the category E-culture⁷⁰. He asked questions and went to visit in person some of the sites identified on the model such as the area of Lovoni, whose people had a crucial role in the history of the island. This visit paved the way for UNESCO accepting Fiji's request to be considered for World Heritage Listing. Dr Bandarin advised on the proposal and helped negotiate technical and financial assistance from the World Heritage Centre for the preparation of the Nomination Dossier⁷¹. More workshops and village level meetings followed. A first submission for the listing of Levuka town as a WHS was done only in January 2011 but returned with recommendations. Finally after a second submission in January 2012, Levuka Historic Port Town was successfully inscribed on the World Heritage List in June 2013.

Despite the absence of a direct causal relationship between the P3DM process and the proclamation of Levuka as WHS, the P3DM has with no doubt contributed to this process. First, the communities of Ovalau got involved "hands-on" in a process adding value to traditional knowledge and aimed at documenting both their tangible and intangible heritage. This raised awareness and set the ground for further community mobilisation around these themes. Community participation was crucial to prepare the nomination document necessary for the submission. Second, the "UNESCO Director at the time, Dr Bandarin, found in the model a tangible proof of the cultural significance of Levuka" (Elizabeth Erasito, pers. comm.). The model showed the existence of several layers of history, knowledge, and culture going beyond the colonial legacy. Finally and most important this process cemented the idea that *"cultural heritage on the island is everyone's business. It is an important resource for education purposes. Cultural heritage is an important part of the identity of the island and the people who live there."*⁷²

⁶⁹ It is worth noting that the Fiji Museum has recorded [only] approximately 30 pre-historic sites on the Island of Ovalau. *A case Study on Levuka* presented at The Culture Heritage Management and Tourism: a UNESCO conference/workshop for the enhancement of stakeholder cooperation in tourism development and heritage preservation in Asia and the Pacific, Bhaktapur, Nepal, 8-16 April 2000.

⁷⁰ The World Summit Award honours excellence in multimedia and e-Content creation. For more information visit: <http://www.wsa-awards.org.nz/showcase/2007-pacific/pgis.html>

⁷¹ Nomination Dossier, Management Plan p.17.

⁷² *Ibid.* p.24.

Annex 4 Case study: Scaling-up Participatory 3D Modelling in Samoa

Started as a pilot initiative of the GEF-funded *Integration of Climate Change Risks and Resilience into Forestry Management in Samoa* (ICCRIFS) project⁷³, Participatory Three-Dimensional Modelling (P3DM) has been rapidly scaled-up in Samoa. Since 2012 sixteen Participatory 3D Models were built in the country generating significant interest by stakeholders and involved communities, and managing to earmark co-financing from the Government of Samoa and the European Union. The government of Samoa has identified P3DM as an appropriate tool for engaging communities and building trust in government initiatives, especially those dealing with land issues. International development projects are often delayed because of procurement or other administrative reasons and communities involved in long series of consultations struggle to recognise the link between the projects intended objectives and actual implementation on the ground.

"P3DM is a great tool for us in Samoa. It is really helping our communities, schools and all stakeholders to understand the different scenarios, topography and the allocation of different resources. I believe that it is very helpful. Sometimes when we are carrying out consultations [without a 3D model] people are a little bit confused on what we are talking about. However, a picture speaks more than 1000 words" (Suluimalo Amataga Penaia, Chief Executive Officer, Ministry of Natural Resources and Environment).

The Forestry division of Samoa has played a leading role in promoting the implementation of P3DM activities not only within the Division⁷⁴ but also by different divisions within the Ministry⁷⁵. Two staff of the ICCRIFS project were initially trained in the Solomon Islands in a workshop organised by The Technical Centre for Agricultural and Rural Cooperation (CTA) in partnership with UNDP, The Nature Conservancy and Partners with Melanesians (PwM). At that time the project was still in its infancy and implementation was delayed. The introduction of P3DM smoothed implementation and generated interest and commitment from the local population. The first pilot exercise – conducted with technical support of PwM and CTA – covered 14 villages in the North East of Upolu (the most populated island in Samoa) and saw the active participation of 80 Matai (Village and Family Representatives) and 150 other community members including women and girls (35% of the total). The P3DM exercise, broadcasted on TV and covered by the main local newspapers, attracted significant interest. As a follow-up all P3DM exercises, apart those facilitated within ICCRIFS project, have been demand-driven⁷⁶.

⁷³ This project is implemented through UNDP under the Forestry Division of the Ministry of Natural Resources and Environment (MNRE) of Samoa.

⁷⁴ Under the Forestry Division P3DM was carried out for all three ICCRIFS project sites: Lauli'i to Falevao (covering 14 villages), Mauga o Salafai in Saavai'i (8 villages) and Lake Lanoto'o (3 villages) benefiting a total population of 16,745 people. In November 2014, the FAO GEF-funded project Forestry Protection and Conservation and Protected Areas Management (FPAM) carried out a P3DM for the villages of Taga and Gaitavai in Saavai'i. The villages requested assistance to the project after seeing the positive impacts of P3DM in the neighboring communities.

⁷⁵ The Water Division developed a P3DM for the Apia watershed covering three sub-catchments and has a new model in the pipeline to cover the Vaisinago sub-catchment, initially excluded. The Disaster Management Office has been engaged in the model-making and is interested in developing an island-wide Model for disaster risk management.

⁷⁶ Lauli'i Primary school requested the assistance of the Forestry Division for building a model for the National Science Fair. St. Mary School did the same for their own school Fair and covered the Vaitele village, the venue for the Third International Conference of SIDS (September, 2014). Also the Fiamalamalama School for students with disability prepared a model for the National Science Fair "living with climate change" to raise students' awareness on climate change and climate change adaptation issues, as well as disaster risk reduction.

P3DM proved to be an excellent tool for discussing watershed management and land use priorities. Communities identified areas for conservation and forest rehabilitation⁷⁷. In Mauga o Salafai National Park, it was evident from the model that farming and grazing activities were encroaching within the National Park, covering at least one third of its area. With the support of the MNRE Disaster Management Office, the P3DM process raised awareness on environmental and climate-related risks and set the ground for identifying safe zones (beyond 60 m a.s.l.) and escape routes in case of tsunamis. In the village of Falefa in Upolu, villagers noted that the mangrove area had reduced severely (to less than one hectare) after the hurricane and this encouraged them to protect the area. It also helped thinking about alternative income-generating activities. In the village of Lalomalava in Savaii, villagers decided to rehabilitate coconut trees, a key crop in Samoa culture that was no longer substantially contributing to their livelihoods. They also identified potential areas of cultural interest for tourism development.

After the P3DM workshop villagers were better positioned to influence land use policy-making. The information gathered on the model was used to plan for the Baseline Ecological Surveys and to prepare community-based management plans. It provided a grassroots contribution to the new Forestry Policy⁷⁸ which integrates climate change into forestry management. The model for the Apia water catchment was used to complete the Upland Watershed Management Policy, watershed management plans for the three Apia water catchments, and water tower policies. It also assisted MNRE in developing the City Spatial Plan. P3DM has made an invaluable contribution to the success of the project, considered one of the most effective in the area of environment and natural resources management⁷⁹, and is regarded as a best practice.

Between February and March 2015 the first tourism project funded by the Global Environment Fund in Samoa *Enhancing the resilience of tourism reliant communities to climate change risks* implemented through UNDP sought the technical assistance of the MNRE to build other eight P3D models with the aim of developing climate resilient Tourism Development Areas management plans. At the time of writing several P3DM projects were already in the pipeline⁸⁰ and the Forestry Division team was requested from SPREP to provide technical assistance in Tonga. American Samoa also showed interest in developing participatory 3D models. Having all key government⁸¹ and regional stakeholders involved in this process has been key to its replication.

⁷⁷ The project provides seedlings, sets up eco-forestry demonstration plots and helps setting the nurseries.

⁷⁸ This has not been approved yet but the draft document mentions the valuable contribution of P3DM that is planned to be used as an indicator for effective forestry management.

⁷⁹ ICCRIFS Quarterly Progress Report April (June 2014), Integration of climate change to forest management in Samoa ICCRIFS – PROJECT MANAGEMENT REPORT SERIES (p. 8, 45, 55, 63 and 65).

⁸⁰ The Forestry Division will work on the P3DM of all Manono Island; the Water Division planned to cover the Vaisinago sub-catchment (April 2015) and the PACC project through UNDP-SPREP is planning to cover the Tafitoala Watershed.

⁸¹ Key stakeholders include the Planning and Urban Management Division (PUMA), Forestry Division, Water Resources, Infrastructure, Disaster Management Office, People Services within MNRE; the Ministry of Agriculture; and the Ministry of Women, Community, Internal Affairs and Social Development.

Annex 5 Key events and products

Date	Location	Activity
2002-2014	Online	Nurturing an international Community of Practice including practitioners based / operating in the Pacific Region
Apr 2005	Ovalau, Fiji	Introduction of P3DM in the region and training of partner organisations (TNC Solomon Islands, SPC Fiji, PwM Papua New)
Sept 2005	Nairobi, Kenya	International conference Mapping for Change: Participatory Spatial Information Management and Communication. Attended by delegates from the Pacific.
Apr 2006	London, UK	Publication of PLA 53 (IIED/CTA) Mapping for change: practice, technologies and communication (printed). Included case studies from the Pacific.
Nov 2006	Paris, France	Workshop on Participatory Cultural Mapping at UNESCO followed by publications by UNESCO: Building critical awareness of cultural mapping: a workshop facilitation guide and The role of participatory cultural mapping in promoting intercultural dialogue: We are not hyenas; a reflection Paper
June 2007	London, UK	Publication of PLA 53 (IIED/CTA) <i>Mapping for change: practice, technologies and communication</i> in 12 languages (online & CD)
Nov 2007	Venice, Italy	World Summit Award, category e-culture for the project: <i>Participatory 3D Modelling (P3DM) for Resource Use, Development Planning and Safeguarding Intangible Cultural Heritage in Fiji</i>
2009	Online	The UNESCO World Report on Cultural Diversity makes reference to P3DM done by Ogiek Peoples (2009)
Nov 2010	Online	Publication of new edition of handbook <i>Participatory 3-Dimensional Modelling: Guiding Principles and Applications</i>
Jun 2010	Rome, Italy	Presentation of the <i>Training Kit on Participatory Spatial Information Management and Communication</i> produced by CTA in partnership with IFAD at IFAD HQ during the IFAD, CTA & ILC Learning Event on Participatory Mapping; 16th June 2010, IFAD, Rome
Feb 2011	Online / DVD	Launch of the <i>Training Kit on Participatory Spatial Information Management and Communication</i> (English and Spanish version)
May 2012	Honiara, Solomon Islands	Awareness Raising and Planning workshop on <i>Participatory Mapping and Community Empowerment for Climate Change Adaptation, Planning and Advocacy</i>
Sept 2014	Apia, Samoa	Side event at the International conference on Small Island Development States “Increasing resilience to climate change and sustainable management of natural resources through participatory three dimensional models with communities in Samoa” organised by MNRE
Nov 2014	Sydney, Australia	Running of 3 major activities at the 6 th World Park Congress in collaboration with UNDP, IUCN, IPACC and the Indigenous Partnerships Program of the Wet Tropics Management Authority
Feb 2015	Manase Village, Savai'i Island Western Samoa	PGIS/P3DM learning route – educational cross-visit for GIS training on base map production, data capturing, extraction and digitization

Annex 6 Partners and funding organisations

Organisation	Location of offices	Role
The Nature Conservancy	Australia office + Solomon Islands	Funding, co-funding and implementation
Secretariat of the Pacific Community (SPC)	Nadi, Fiji	Provision of in kind support
WWF Pacific	Nadi, Fiji	Implementation
Locally Managed Marine Area Network (FLMMA)	Nadi, Fiji	Implementation
UNDP, GEF-SGP	NY, USA	Funding
IUCN	Gland, Switzerland	Funding
SPREP	Apia, Samoa	tbd
UNDP, Samoa Office	Apia, Samoa	Funding
UNDP, GEF-SGP, Samoa Office	Apia, Samoa	Funding
Swiss Re Insurance Company	Switzerland	Funding
Partners with Melanesians (PwM)	Port Mosby, Papua New Guinea	Implementation
AusAID	Australia	Funding
Green Forum Western Visayas	Philippines	Implementation
World Bank	NY, USA	Funding
European Union	Brussels	Funding
Wet Tropics Management Authority	Cairns, Australia	Implementation
Ministry of Natural Resources and Environment (MNRE)	Apia, Samoa	Implementation

Annex 7 P3DM activities in the Pacific

Date	Location	Country	Purpose	Implementing Agency	Supporting Agency (Financial and technical)	CTA Input	Scale
2005 (April)	Ovalau Island	Fiji	Introduction of the tool in the Pacific region, training and supporting local communities to develop terrestrial and marine management plans as well as to educate the younger generations in understanding their land	WWF Pacific, FLMMA Network, SPC, Ministry of Indigenous Affairs, University of South Pacific, National Trust of Fiji	CTA, USP, WWF	Technical on site + Funding	1:10,000
2006-2007 ⁸²	Managalas Conservation Area, Ijivitari District, Afore Sub district of Oro province	Papua New Guinea	Conservation and Land use Planning	Partners With Melanesians Inc. Managalas Development Foundation Inc.	World Bank Rainforest Foundation Norway	Trained facilitators in 2005 + advisory	1:12,000
2007 (August)	Raumoco Watershed, Lautem District, Sub-Districts of Luro and Muro	East Timor	The model was produced in the context of the Coordinated Actions for Disaster Risk Reduction Empowerment (CADRE) project and specifically within the framework of the Raumoco Watershed for the community-based disaster risk reduction program	Green Forum - Western Visayas CONCERN, Republica Democratica de Timor-Leste (RDTL)	Coordinated Actions for Disaster Risk Reduction Empowerment (CADRE) Project, Preparedness Programme of the European Commission's Humanitarian Aid department (DIPECHO)	None	1:8,000
2009 (June)	Chivoko, Choiseul	Solomon Islands	Forest management: define customary boundaries and explore alternative land uses for the forest	Lauru Land Conference of Tribal Community and TNC	The exercise has been made possible by the coordinated effort of The Nature Conservancy, the Lauru Land Conference of	Trained facilitators in 2005	1:20,000

⁸² Because of Cyclone Guba the finalisation of the P3DM was delayed.

Date	Location	Country	Purpose	Implementing Agency	Supporting Agency (Financial and technical)	CTA Input	Scale
					Tribal Communities (LLCTC) and funding provided by the by Swiss Reinsurance Company, Switzerland. http://www.iapad.org/applications/plup/solomon.htm		
2011 (February)	Boeboe, Choiseul	Solomon Islands	Planning adaptation to climate change	Lauru Land Conference of Tribal Community, Partners with Melanesians and The Nature Conservancy (TNC)	AusAID	Trained facilitators in 2005	1:10,000
2011 (August)	Manus Province	Papua New Guinea	To enable sound decision making and planning for climate change adaptation	Partners with Melanesian Inc., Manus Environment Conservation Action Network (MECAN)	AusAID and The Nature Conservancy (TNC)	Trained facilitators in 2005	1:20,000
2012 (May)	Naro	Solomon Islands	Demonstration model built during an orientation and planning workshop on the use of P3DM for adaptation planning	UNDP, Solomon Islands	CTA, UNDP	Trained the trainer of the facilitator in 2005	1:5,000
2012 (October)	Arakabesang Island	Palau	P3DM sample prepared to advocate for the use of P3DM in Palau and presented to Governors of each state in Palau during a workshop hosted by Palau International Coral Reef Center	Office of the PALARIS, Ministry of Public Infrastructure, Industries and Commerce	Office of the PALARIS, Ministry of Public Infrastructure, Industries and Commerce	Exposed facilitators to P3DM practice in 2012+ technical advisory	1:10,000
2012	Auluta Basin, East Fataleka, Malaita	Solomon Islands	Developed in support of the Auluta Basin Oil Palm Project. The aim of the project is to develop the area into an agriculture zone for investors for oil palm development. The process	Solomon Islands Ministry of Agriculture and Livestock, The Nature Conservancy (TNC)	Solomon Islands Ministry of Agriculture and Livestock	none	n.a.

Date	Location	Country	Purpose	Implementing Agency	Supporting Agency (Financial and technical)	CTA Input	Scale
			includes: landowners rights recognition and engagement; land survey and registration; infrastructure development; land use and planning.				
2013 (June)	Epi Island	Vanuatu	To identify environmental and climate change-related problems and solutions (especially road improvement strategies) i.e. to develop community-owned consensual management and adaptation plans.	Pacific Adaptation to Climate Change (PACC) project	Global Environment Facility (GEF) and the Australian Government, UNDP, SPREP	Exposed facilitators to P3DM practice in 2012	1:20,000
2013 (June)	Lauli'i-Falevao area (14 villages), Upolu	Western Samoa	Integration of climate change risks and resilience into forestry management in Samoa for the Laulii – Falevao project area. Pilot used to build in-country capacity in P3DM.	MNRE with Assistance from Partners with Melanesia	GEF, UNDP, MNRE Forestry Division, ICCRIFS Project	Advisory+ Provided training material and CDs+ Trained facilitators in 2005 + Exposed facilitators to practice in 2012	1:10,000
2013 (August)	Almami, Bogia District, Madang Province	Papua New Guinea	Biodiversity Conservation, Land use and Council Ward Planning, Carbon Stock assessment, community consultation as part of the Climate Change Resilience Programme on Reducing Emissions from Deforestation and Forest Degradation (REDD).	Partners With Melanesians	TNC Papua New Guinea, TNC Australia, AusAID, Madang Provincial Government, Almami Local Level Government Council (technical only)	Trained facilitators in 2005 and provided advisory support	1:10,000
2013 (November)	Mauga O Salafai (including Iva, Vaiafai, Salelavalu, Sapapalii, Fusi, Fatausi, Fogapoa	Western Samoa	Integration of climate change risks and resilience into forestry conservation and buffer zone management within and around the Mt Salafai protected area.	MNRE	GEF - UNDP, MNRE Forestry Division, ICCRIFS Project	Exposed facilitators to P3DM practice in 2012	1:10,000

Date	Location	Country	Purpose	Implementing Agency	Supporting Agency (Financial and technical)	CTA Input	Scale
	and Faga), Savaii Island						
2013	Lauli'i Primary School, Upolu	Western Samoa	School Project for the National Science Fair to develop a P3DM for the Laulii Village.	MNRE (ICCRIFS project)	GEF - UNDP, MNRE Forestry Division, ICCRIFS Project	Informative (handbook)	1:8,000
2014 (February)	Lake Lanoto'o (3 villages Lotofaga, Nuusuatia & Fusi), Upolu	Western Samoa	Integration of climate change adaptation and community resilience through forestry management in the Lake Lanoto'o project area	MNRE	GEF - UNDP, MNRE Forestry Division, ICCRIFS Project	Exposed facilitators to P3DM practice in 2012	1:5,000
2014	Apia Catchment including the watersheds of Fuluasou, Loimata o Apaula and Gasegase in Upolu Island	Western Samoa	Integrated water resource management for the Apia Catchment specifically for the watersheds of Fuluasou, Loimata o Apaula and Gasegase.	MNRE Water Sector, MNRE Forestry Division, ICCRIFS Project	EU, GEF - UNDP, Samoa Government	Exposed facilitators to P3DM practice in 2012	1:5,000
2014	Vaitele Village, venue of the 3rd SIDS Conference, Upolu Island	Western Samoa	School Project for the school Science Fair. Showcase climate change related issues and disaster risk reduction (evacuation sites for the area).	St Mary's Primary School, Upolu and MNRE (ICCRIFS project)	GEF - UNDP, MNRE, Forestry Division, ICCRIFS Project	Informative (handbook)	1:10,000
2014	Motootua Area where the school is located	Western Samoa	School Project for the National Science Fair "living with climate change" to raise students' awareness on climate change and climate change adaptation issues, as well as disaster risk reduction	Fiamalamalama School, Upolu and MNRE (ICCRIFS project)	GEF - UNDP, MNRE, Forestry Division, ICCRIFS Project	Informative (handbook)	1:10,000
2014 (October)	Cairns, Queensland	Australia	Mandingalbay Yidinji People documenting their traditional	Wet Tropics Management Authority	IUCN/GEF-SGP	Trained facilitators in 2005 and	1:10,000

Date	Location	Country	Purpose	Implementing Agency	Supporting Agency (Financial and technical)	CTA Input	Scale
			environmental and cultural knowledge for transmitting it to younger generations and for planning purposes.			technical advice	
2014 (May)	Watabung Local Level Government, Daulo District Eastern Highlands Province	Papua New Guinea	Planning for disaster preparedness and managing the Ona Keto Reforestation Project	Partners with Melanesians (PwM) and the Ona Keto Peoples Foundation Inc.	TNC Australia, AusAID, Rainforest Foundation Norway	Trained facilitators in 2005 and advisory support	1:5,000
2014 (November)	Gaitavai & Taga villages, Savaaii	Western Samoa	Forest Conservation and Protected area Management (FPAM) project - Building capacity to enhance the sustainable livelihoods of local communities living in and around protected areas.	MNRE (ICCRIFS project)	FAO-GEF and MNRE	Exposed facilitators to P3DM practice in 2012	1:10,000
2015 (February)	Lepuiai and Faleu, Manono Island	Western Samoa	Enhancing the resilience of tourism reliant communities to climate change risks by developing climate resilient Tourism Development Areas management plans	Government of Samoa: Samoa Tourism Authority (STA)	UNDP, GEF, MNRE	Exposed facilitators to P3DM practice in 2012 and provided training material	1:5,000
2015 (March)	Sataoa & Saanapu, Upolu	Western Samoa	Enhancing the resilience of tourism reliant communities to climate change risks by developing climate resilient Tourism Development Areas management plans	Government of Samoa: Samoa Tourism Authority (STA)	UNDP, GEF, MNRE	Exposed facilitators to P3DM practice in 2012 and provided training material	1:10,000
2015 (March)	Lalomauga & Saleapaga, Upolu	Western Samoa	Enhancing the resilience of tourism reliant communities to climate change risks by developing climate resilient Tourism Development Areas	Government of Samoa: Samoa Tourism Authority (STA)	UNDP, GEF, MNRE	Exposed facilitators to P3DM practice in 2012 and provided	1:5,000

Date	Location	Country	Purpose	Implementing Agency	Supporting Agency (Financial and technical)	CTA Input	Scale
			management plans			training material	
2015 (March)	Satuiatua, Savaii	Western Samoa	Enhancing the resilience of tourism reliant communities to climate change risks by developing climate resilient Tourism Development Areas management plans	Government of Samoa: Samoa Tourism Authority (STA)	UNDP, GEF, MNRE	Exposed facilitators to P3DM practice in 2012 and provided training material	1:5,000
2015 (March)	Faala & Vailoa Palauli, Savaii	Western Samoa	Enhancing the resilience of tourism reliant communities to climate change risks by developing climate resilient Tourism Development Areas management plans	Government of Samoa: Samoa Tourism Authority (STA)	UNDP, GEF, MNRE	Exposed facilitators to P3DM practice in 2012 and provided training material	1:10,000
2015 (March)	Falealupo, Savaii	Western Samoa	Enhancing the resilience of tourism reliant communities to climate change risks by developing climate resilient Tourism Development Areas management plans	Government of Samoa: Samoa Tourism Authority (STA)	UNDP, GEF, MNRE	Exposed facilitators to P3DM practice in 2012 and provided training material	1:10,000
2015 (March)	Manase, Savaii	Western Samoa	Enhancing the resilience of tourism reliant communities to climate change risks by developing climate resilient Tourism Development Areas management plans	Government of Samoa: Samoa Tourism Authority (STA)	UNDP, GEF, MNRE	Exposed facilitators to P3DM practice in 2012 and provided training material	1:5,000
2015 (March)	Lano, Savaii	Western Samoa	Enhancing the resilience of tourism reliant communities to climate change risks by developing climate resilient Tourism Development Areas management plans	Government of Samoa: Samoa Tourism Authority (STA)	UNDP, GEF, MNRE	Exposed facilitators to P3DM practice in 2012 and provided training material	1:5,000

Annex 8 Excerpts from documentation - UNESCO Heritage Listing

The cultural or intangible history of Levuka is also multi layered and it is still reflected in the cultural diversity of Levuka today. There is a rich and diverse cultural record of the prehistory of Fiji (before the colonisation of Fiji by the Europeans) in areas adjacent to the town. The interior of Levuka town has substantial physical evidence of prehistoric settlement and hill fortification. The most famous and best preserved of these (to date) is the Korolevu Hill Fort. The later history of Levuka complements the prehistory of Ovalau in that it lends another cultural resource of potential benefit to tourism in Levuka. And not just on land – a maritime archaeological investigation of the Levuka harbour has revealed the presence of a number of 19th century shipwrecks. Levuka is a site with a rich cultural history that is prominently reflected in its tangible (the townscape) and to a lesser extent in its intangible (i.e. cultural and social) heritage. The evidence of the physical and cultural history of Levuka gives it a very unique and special place in Fiji's and the Pacific's history. (Nomination Document, p.6)

Interpretation and telling the stories about Levuka and Ovalau in general is significant (also a form of awareness) and an education medium for visitors alike. Interpreting heritage provides understanding, understanding helps enjoyment and enjoyment promotes appreciation. Once appreciated, heritage is better protected. (Nomination Document, p.121)

The Ministry of Education and the Department of National Heritage, Culture and Arts engages in presentations to schools on the importance of their heritage, in particular the heritage of Levuka. As part of this exercise, interactive activities with children are encouraged to promote learning about the heritage of other places and finding ways to protect Levuka's heritage. [...] World Heritage in Young Hands –the development of a curriculum focusing on World Heritage in the local context is into its initial stages of development with the schools on Ovalau. (Nomination Document, p.238)

The Government, through the activities of the National Trust, Fiji Museum and Department of National Heritage, Culture and Arts, and Levuka town Council has put a large effort over the years since 1996, explaining the concept of World Heritage to the community of Levuka and more recently this work has been extended to cover all the people of Ovalau.

This has been done through workshops, village meetings, school visits, publications such as posters and newsletters, the publication of Levuka: Living Heritage (by the University of the South Pacific (USP) & the Levuka Historical and Cultural Society). This work has resulted in a climate of broad understanding and general support for World Heritage on the island. Continuation of this understanding and support cannot be taken for granted; it must continue to be earned.

Particular attention will be paid to working with the schools on the island, so that the new generation grows up understanding the positive role cultural heritage can have in the social and economic life of the community. (Management Plan, p.122)

Annex 9 Excerpts from Mid Term Review - ICCRIFS Project

Another **successful achievement** for improved ownership has been the methodology of Participatory 3-dimensional Models (P3DM), where the community members are producing models of their villages and surrounding areas, and discuss a plan for better land use. (Mid Term Review, p.8)

Some **unanticipated positive results** as compared with the original design have been the ignited enthusiasm in many of the villages based on the Participatory 3-dimensional (P3D) model methodology that was included in the project design during the inception phase. (Mid Term Review, p.18)

As a key element of the site management planning process, regional and International experts have been engaged to build capacity on the P3D technique in target communities and replication of this work on all project sites. A P3D model scoping mission and a full participatory P3D workshop were completed for the Lauli'i to Falevao upland forest areas, allowing community engagement, empowerment and planning in target communities for the Community-based Conservation Areas (CBCA). Based on the P3D model planning, 14 villages have established their CBCAs and developed draft management plans for their areas. (Mid Term Review, p. 24)

P3DM was identified during the project Inception Phase as a tool to unlock the potential of all stakeholders to plan for effective management of sites for improved Climate Change resilience and ecosystem services. It is a pity that the P3D methodology was included a bit late, after many of the project activities had already been planned. It could also have been used as part of the community vulnerability and adaptation assessments. **To initiate the P3DM as early as possible in the land use planning and project planning is a lesson from the project.** (Mid Term Review, p.25)

P3DM help the stakeholders through the process and outputs, fuel self-esteem, build local ownership to the project activities and raise awareness of interactions between ecosystems and land use management issues. Even though the P3DM was included a bit late, it was early enough to be used as a tool for planning of the community-based conservation areas (CBCA). This gave the opportunity to local stakeholders to discuss watershed management and land use priorities, to be able to identify on the model the areas they feel need conservation or forest rehabilitation. This is **of huge value to the project objectives** of conscience building for climate-resilient sustainable land use management. (Mid Term Review, p.25)

The P3D model workshop conducted for the Lauli'i to Falevao area allowed farmers to participate in the planning process for conservation of critical watersheds and forest areas, as well as identifying critical areas for rehabilitation. (Mid Term Review, p.25)

Another **very important and successful achievement** has been the methodology of P3D models, where the community members are producing three-dimensional models of their villages and surrounding areas, and through that exercise are able to discuss and plan better land use. The P3D model approach has **achieved great interest at national level**. It is already being used for planning in agriculture and health, often with advice from ICCRIFS. So far ICCRIFS has given this advice for free, but since it is gradually taking up more of the project's time it would be logical that the other projects cover at least the costs for these activities. (Mid Term Review, p.45)

To obtain ownership, the population should not only be consulted but have real influence from the first ideas throughout the process. **Two very positive examples** have been the initial village consultation, and later the P3D planning process. Both campaigns were carried out in all the participating villages. (Mid Term Review, p.53)

The two important activities of village consultation and P3D workshops have given the project a lot of information about the beneficiaries and the natural resources in the villages. Except for this, the information-flow is mostly one-way (supply-driven). (Mid Term Review, p.55)

*Village consultations and P3D model methodology has **improved conscience building** in relation to the application of climate sensitive planning processes, use of climate information, and other technical activities, and interest and support to the project. (Mid Term Review, p.62)*

*The Participatory 3-Dimensional Model (P3DM) methodology is an **efficient participatory method** to improve local ownership, let the village population understand the problematic around natural resource management with a watershed approach, and most of all assuring their participation in sustainable land use planning. P3DM can therefore be regarded as a **best practice that should be exported to other parts of the world** through UNDP-GEF or other projects. (Mid Term Review, p.63)*

Some important lessons learnt during implementation of the P3DM are: (i) The exercise should (for other projects or project phases) be carried out as early as possible, to assure the village's land use planning and priorities as the basis for the following project activities; (ii) Project site boundaries (focusing on the natural landscape) do not correspond with local community or village boundaries if the sites are not designed that way from the start. Some village boundaries may even cross the ridges into other watersheds; (iii) National Parks boundaries generally do not reflect the lowland area used by the local communities. To engage the villages in these areas it is critical to include the lower parts of the watersheds, which in Samoa means down to the coastline. Also around other National Parks it is important to include as part of the project site the local villages that are formal or informal users of the protected area. (Mid Term Review p.63)

*The project is for the moment **one of the most successful** that is implemented in Samoa in the area of environment and natural resources management. [...] Another **very important and successful achievement** for improved ownership has been the methodology of P3D models, where the community members are producing three dimensional models of their villages and surrounding areas, and through that exercise are able to discuss and plan better land use (Mid Term Review pp. 65, 66)*

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UNESCO Website, [Levuka World Heritage Listing](#)

UNESCO Website, [Nomination File Levuka WHS listing](#)

Annex 10 List of documented media coverage

Al Jazeera

Samoans devise means to mitigate disasters (video): <http://tinyurl.com/nd2clbs>
<http://bcove.me/le6edvt5>

Samoa Observer

Luatuanu'u welcomes high profile delegation: <http://tinyurl.com/qa7gqts>

3D map excites villages: <http://tinyurl.com/nurcft6>

Government invites Papua New Guinea group: <http://tinyurl.com/osm2ze2>

Getting back to basics: <http://tinyurl.com/qydk6ft>

Fiji One TV

Old capital marks 1st anniversary as Heritage site: <http://tinyurl.com/ogeenro>

Australia Plus Pacific

Fiji's first capital Levuka gains World Heritage listing: <http://tinyurl.com/pfl7t85>

Fiji Village

President launches Heritage Initiatives and Projects in Levuka: <http://tinyurl.com/naevfsI>

Agrikalsanius

August 2012 Solomon Islands Ministry of Agriculture and Livestock Monthly Newsletter

Tech President

Samoan Gov't Climate Change Initiative Includes Crowdsourced 3D Map:
<http://tinyurl.com/qf89nsy>

Annex 11 List of Video Productions

Silika Tuivanuvou shares her experience in practicing P3DM in Fiji:

<http://vimeo.com/10975241>

Mapping Land, Sea and Culture: an Award-winning Participatory 3D Modelling Process in Fiji: <http://vimeo.com/30723012>

Top UN officials Helen Clark and Naoko Ishii praising outcome of P3DM activities in Samoa:

<http://vimeo.com/111563555>

Participatory 3D Modelling (P3DM) for bottom-up decision-making in Vanuatu:

<http://vimeo.com/90959374>

Participatory 3D Modelling of Manus Island, PNG: <http://vimeo.com/38496202>

Modelling the Future in Boe Boe Community, Solomon Islands: <http://vimeo.com/32145985>

Participatory 3D Modelling (P3DM) for bottom-up decision-making in Vanuatu:

<https://vimeo.com/90959374>

Hands on Culture - Participatory 3D Modelling with Mandingalbay Yidinji People:

<https://vimeo.com/122341109>

Moments of recognition: Luvuyo Mandela "receives" Mandingalbay Yidinji Traditional peoples' Participatory 3D Model <https://vimeo.com/113166775>

Experiencing P3DM through the eyes and heart of a Mandingalbay Yidinji traditional land owner <https://vimeo.com/112616323>

Empowering moments: P3DM brought us back together as a people

<https://vimeo.com/113224396>

Empowering moments: reconnecting to our history and people <https://vimeo.com/112770066>

Participatory 3D Mapping: community led planning in Papua New Guinea

<https://youtu.be/neSk5RzxZnU>