

# The multifaceted impacts of P3DM: experiences from the Solomon Islands



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## Introduction

Literature on the tyranny of participation underlines that community-based development is promising but inevitably messy, difficult, approximate and unpredictable in its outcomes (Cleaver, 2001). These studies legitimately caution against treating participatory processes as acts of faith. However, they may have overlooked the value of open-ended processes where participants are the principal actors.

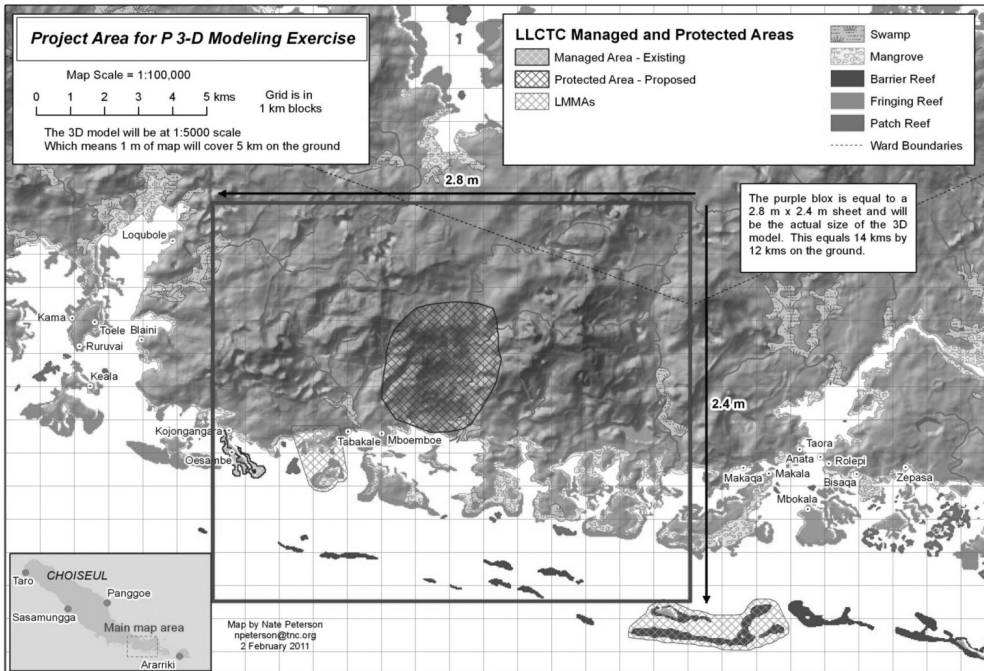
This article uses case studies from Boe Boe and Chivoko in the Solomon Islands to show that participatory three-dimensional modelling (P3DM) can achieve both intended objectives and unintended positive outcomes. The democratic character of the method – combined with durability, flexibility and a sense of ownership – both serves community needs and ensures that processes are not dictated by an outside agenda.

The article first provides a project background and outlines the participatory methodology adopted. The results are then explained in light of the distinctive charac-

teristics of P3DM combined with a respect for principles of good practice.

## Background

Both Chivoko and Boe Boe are small coastal villages of around 50 households, located in Choiseul Province (locally named Lauru) in the Solomon Islands. Choiseul is one of the more remote provinces of the country, with an undeveloped mountainous forest interior. There are few roads and its communities are mainly connected by boat. As a traditional Melanesian society, both villages are male-dominated with customary land ownership and traditional institutions. Villagers depend on reefs, mangrove ecosystems, forest and bush gardens for their livelihoods. In the last decade they have faced increasing environmental and development challenges, including the depletion of natural resources, commercial logging and, more recently, proposed mining developments. The threat of climate change is beginning to further undermine social and environmental resilience.



Map: Nate Peterson

**Boe Boe, Solomon Islands.**

*Boe Boe is along the coast and the sea erodes it. It is part of a very steep mountain and people do not know where to go because it is not fit enough to build houses. It is quite dangerous having the village down there, and the mining company up there, and the sea coming up. We do not know where to go (Winifred Pitamama 2012, personal communication).*

In 2007, the villagers of Chivoko won a high-court injunction against a logging company with support from the Lauru Land Conference of Tribal Community (LLCTC), an indigenous organisation which represents the interests of customary chiefs and their communities in Lauru. In 2009, with financial support from Swiss-RE insurance, LLCTC worked with the community to create a participatory 3D model to clearly define their customary boundaries, and explore alternative land

uses for the forest. Following the success of the Chivoko P3DM, in February 2011 the LLCTC facilitated a P3DM in Boe Boe with Partners With Melanesians (PWM), a Papua New Guinea-based development organisation.<sup>1</sup> The P3DM exercise was conducted alongside other participatory activities including participatory video, household surveys and shoreline walks, based on the idea that local communities can valuably contribute to adaptation decision-making.<sup>2</sup>

**The method**

In both cases, experienced facilitators assisted students and community volunteers to build a cardboard, three-dimensional model of their land (see Box 1). After construction, village informants started to visualise their local spatial knowledge using paint, yarns and push-pins, and developed the legend. Both

<sup>1</sup> The P3DM was part of the project Building the Resilience of Communities and their Ecosystems to the Impact of Climate Change in the Pacific, coordinated by James Hardcastle. It was funded by the Australian Government (AusAid) and implemented through The Nature Conservancy (TNC).

<sup>2</sup> For more information, see Rirmae and Hardcastle (2011).

Photo: Javier Leon



**Boe Boe villagers building their participatory 3D model.**

**Box 1: Participatory three-dimensional modelling (P3DM)**

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

models provided a platform for discussing each community’s challenges and identifying locally appropriate solutions.

In Boe Boe, as a parallel process, a geographic information system (GIS) expert developed a digital elevation model (DEM) of the village. This was used to groundtruth features on the model and illustrate ‘what if?’ scenarios of sea-level rises of 50cm, 100cm and 200cm. The purpose was to show the exact elevation of the village above mean sea level and what areas risked being submerged with a projected sea level rise of 1m by 2100 or 2m, for example in the extreme case of

Photo: Javier Leon



Finalising the three-dimensional model in Boe Boe.

tsunami (Javier Leon, personal communication 2011). There was an open discussion around the participatory 3D model, comparing the DEM scenarios to actual experiences of high tides and storm events. In some instances, the community challenged the DEM scenarios, identifying the presence of near-shore rocks, an

exposed reef area and mangrove forest that would provide a buffer against the predicted inundation. The combined use of the digital model with the relief model, expressing the community's perception of risk and landscape change, allowed a real-time integration of science with local knowledge.



**Box 2: Interviews on the impact of the P3DM exercises**

In Boe Boe, Antonella Piccolella conducted one-to-one in-depth semi-structured interviews with community members during a workshop in Honiara, May 2012.<sup>3</sup> It was organised by the Technical Centre for Agricultural and Rural Cooperation (CTA), TNC, the United Nations Development Programme (UNDP) and PWM. The workshop raised awareness on the potential use of P3DM in climate change adaptation and shared lessons learnt by its direct protagonists. These interviews completed information obtained previously from project staff during remote one-to-one interviews, shortly after the modelling exercise.

In Chivoko, both James Hardcastle and Jimmy Kereseka revisited the community in July 2011 as part of the P3DM project evaluation. Both participated in both the Chivoko and Boe Boe P3DM exercises and were very familiar to the community. They discussed the impacts and implications of the exercise with key informants during brief, semi-structured interviews.

exercise and one year after the Boe Boe one, show that P3DM contributed to community resilience across a broad range of development and local governance issues (see Box 2).

**Climate change awareness**

In the context of climate change, a three-dimensional map is very useful since phenomena such as sea-level rise, coastal erosion, floods and landslides have a vertical dimension. In Boe Boe, rising sea levels were already apparent. A base map dated 1992 showed an island that the elders remembered but which was now under water. The P3DM stimulated an important process of self-realisation, providing an alternative to conventional awareness-raising programmes.

**Strengthening resilience**

**Ecosystem conservation**

In both cases, the P3DM emphasised the key role of watershed forests, mangroves and reef conservation in strengthening local resilience. Before the model was created,

**A multi-purpose and open-ended process**

The P3DM exercises were specifically framed around key issues (forest management in Chivoko and adaptation to climate change in Boe Boe). But interviews, conducted two years after the Chivoko

<sup>3</sup> I conducted the interviews in Honiara as a follow-up to my Master's thesis 'Participatory mapping for adaptation to climate change: the case of Boe Boe, Solomon Islands'. I was keen to hear feedback from community representatives and learn more about the impacts of the P3DM activities which took place the year before.



Photo: Javier Leon

Coastal landscape and marine protected areas on the Boe Boe participatory 3D model.

trespassing on marine and terrestrial protected area boundaries was common since their extent was not precisely known. Visualising the small terrestrial protected area in Boe Boe also provided evidence that it needed enlarging. In both cases, participants discussed the reasons underpinning conservation and the conditions under which this status could be suspended.

#### Natural resources management

On the Boe Boe model, villagers identified mangrove areas for sourcing shellfish, wood for building materials and other resources. The women said they had already noticed a significant depletion of natural resources. Due to rising sea levels, they were harvesting edible shellfish in more remote locations. Once gathered around the model they also discussed over-harvesting and the need to adopt more sustainable practices.

*Now when they go for harvesting, they just take what is needed (Winifred Pitamama 2012, personal communication).*

In Chivoko, the Solomon Islands Development Trust provided training in community forestry and eco-forestry techniques and zoning to support the local export of sustainably harvested timber. The model is used to plan these activities with a minimal impact on the forest, the associated watershed values and ecosystem services.

#### Relocating and diversifying economic activities

The model has become an important visual support for reflecting on land use patterns. In Boe Boe, villagers realised that the need to relocate and rethink their economic activities was inevitable. Although independent from the P3DM, the Natural Resources Development Foundation, a local CBO engaged in sustainable forest management, now organises regular training to encourage alternative small income-generating activities including raising poultry, crop diversification and bookkeeping.

## Transmission of knowledge

*Not many people have gone into the bush to see how their land looks like. It is a chance for them, especially for women and children, to know what resources they have in the bush. They started to talk about the village sites, why they had to move from the middle of the mountains down to the sea... They started to convey those stories* (Gideon Solo, 2012, personal communication).

P3DM also facilitates learning about natural and cultural heritage. The participatory process favoured storytelling about sacred sites, which was important for those who did not know the stories or could no longer access those places. Information generated around the model also showed the importance of nature in Melanesian culture. For example, some fishing grounds were traditionally protected for spiritual reasons. Creating sustainable fisheries would strengthen livelihoods and protect cultural heritage.

The community also decided which information was confidential and would not be incorporated in the model, to avoid expropriation by outsiders. Traditional burial sites were not marked on the models, but their existence was temporarily added or pointed out during discussions. Cardboard and paint models allow for such alterations and temporary changes over time.

## Giving voice to women

The P3DM process enabled people from different ages and genders to work together. Both gender groups affirmed their roles in society through the visualisation of locations where they perform their activities. According to Winifred, a teacher involved in the process, the P3DM in Boe Boe was especially important for women, who usually spend all their life in the village, working in the gardens and looking after their families.

*Women look at the model and get the idea that this is our place, we should care about our place rather than giving it to the logging companies to spoil our lands. We should keep all these things for ourselves, for our children* (Winifred Pitamama, 2012, personal communication).

## Rights-based advocacy

The clear visualisation of customary boundaries in Chivoko reinforced the community's legal claims against the granting of a commercial license to a logging company. The success of this conservation effort helped to implement the Lauru Protected Area Network.

According to the Natural Resources Development Foundation coordinator, knowledge generated through the P3DM in Boe Boe has also encouraged active participation in decision-making in the village, by promoting villagers' self-confidence and pride, in contrast to the sense of fatalism and victimisation typical of top-down approaches to development.

*Just a few weeks ago we had a public hearing during an environmental impact assessment for a proposed mining project. People from the government and consultants from overseas came to present a report. They showed a lot of pictures during the presentation. 'We will be drilling this point, we will be drilling that point...' Because of the knowledge from the model, people have a say* (Ringo Kodosiku, 2012, personal communication).

The external environmental impact assessment experts were astonished by such an active civil society, and as a result, the Boe Boe community won an extension on the deadline to submit their comments on the report.

*They were very surprised, because this is not the first place where they did this*



Illustration: Regina Faul-Boyle

While presenting a report on a proposed mining project, external environmental impact assessment experts were surprised by the community's detailed engagement in the discussions.

*public hearing. They have done it in other villages but with different reactions. They normally only have to spend a couple of hours there, but in our village they had to stay overnight* (Ringo Kodosiku, 2012, personal communication).

Although their opposition may not prevent the mining project, the community has secured the complete 'lock-out' of areas they identified as culturally and environmentally important. This clearly reveals the potential of P3DM for rights-based community advocacy.

### Considerations and lessons learnt

The success of these projects involved a combination of the unique characteristics of P3DM with a respect for the basic principles of good practice.

### Advantages of P3DM

P3DM stands out because of its democratic character. Everybody felt free to contribute regardless of their position in society. The limited eye contact and lack of verbal dominance, typical of hands-on group work, allowed participants to feel at ease. The presence of an external entity



Photo: Javier Leon



Although Ellen Taquevala had never seen a map before, she could show where Boe Boe was relocated to during the Second World War.

(the model) enabled people to talk to the model rather than directly confronting each other. Building a model is also fun and engaging, helping to breach the rigid hierarchies governing traditional Luru society. Participants worked deep into the night and from early morning, and it became more and more exciting as people started to recognise their homes, schools and gardens.

Participants clearly identified with the model. Cognitive psychologists explain this due to the third (vertical) dimension, which stimulates memory. A two-dimensional map looks the same from any direction. With a three-dimensional model, what you see varies according to your position. This implies processing a bigger amount of data. The third dimension offers more hints to memory (Rambaldi, 2010). Moreover, the tactile experience is part of the learning process of many indigenous cultures. Ellen Taquevala (74 years old), despite not having seen a map before, recognised her environment

and accurately described how Boe Boe village was relocated from the hills to the coast during the Second World War. Chief Kiplin of Chivoko also described to the younger generation the layout of the pre-war settlement in the hills.

The model belongs to the community and is kept in a public place. It can be updated and applied to any community issue presenting a spatial dimension. It is a repository of precious information, which can be unexpectedly useful, for example during discussions on the proposed Boe Boe mining project.

#### Good practice

Whose problems? Whose solutions?  
Whose knowledge counted?

In both Chivoko and Boe Boe, despite the different project entry points, the P3DM resulted in a much more community-led and community-controlled planning and discussion process. The completed models were given to the chief and, through the chief, to the community. Implementing



Photo: Javier Leon

Chivoko's villagers gather around the completed P3DM model.

project activities were directed by the community with a clear reference to the discussions around the model, supported by other participatory activities. Villagers became actors while outsiders were catalysts and co-learners. Many other internal activities and decisions are still assisted by the model, and conversations with villagers confirm their sense of continued community ownership.

One main limitation was having too little time to discuss community issues in a more structured way. After an initial hesitation, participation in small self-selected groups happened naturally without the need for planning or forcing villagers' involvement. There was a free flow of people in the room where the model was being made. However, the informal unfolding of the process increased the frequency of conversations being interrupted. This made it harder to capture different stories and perspectives.

More time should have been allocated to

collecting and reflecting on information emerging during the P3DM exercise. Having separate discussions for different community groups would have given women greater opportunities to speak up. But the immediate need to capture information – dictated by project-driven timeframes and the short-term presence of external facilitators – should not undermine the pace and interactive process at the local level.

The P3DM project was not an isolated activity, but part of other ongoing initiatives with both TNC and local partners such as LLCTC. All parties could speak Pidgin, which also significantly helped.<sup>4</sup> Trust was built with time, transparency and respect. Cultural sensitivity and an awareness of community problems strengthened the communities' positive involvement. For example, most meetings were in the evening, to avoid interference with the villagers' regular daily activities. This showed a respect for community timeframes and commitments.

## Conclusion

It is hard to predict the multifaceted impacts of a P3DM exercise. But the experiences of Chivoko and Boe Boe confirm the capacity of P3DM for generating community-centred processes. 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 and climate change in line with project objectives, it also became the focal point for discussing alternative livelihood strategies. Other welcome but unplanned impacts included its use for rights-based

advocacy, its impact on women, and its cultural value. The models proved to be compatible with customary Melanesian societies and able to transcend their rigid hierarchic structures. The facilitation team demonstrated respect and cultural sensitivity throughout, and the leadership and intermediary role of the LLCTC and the endorsement of the village chiefs paved the way for a fruitful community engagement. The open-ended nature of participatory mapping, the unique characteristics of P3DM and good facilitation all contributed to the achievement of outcomes beyond project expectations.

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<sup>4</sup> Solomon Islands Pidgin English is the variety of Neo-Melanesian spoken in the Solomon Islands. Pidgin is an English-based language with a limited vocabulary and simplified grammar, which was developed as a means of communication between groups that do not have a language in common.

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