The Danajon Bank Experience:

The facts: For many people in the world, the sea a huge food basket. Fisheries and related industries provide livelihood for up to 400 million people worldwide. In the Philippines, more than 2 million people fish on a full-time basis as a source of food and livelihood (NSO, 2005). In 2001 alone, marine fisheries produced a total of 1.8 million tons of fish and invertebrates valued at PhP 67.4 billion. The world's marine resources have become most highly traded natural resources, accounting for US $ 55.2 billion in international trade (FAO, 2004).

Scientists have described the Philippine Islands as the **"center of the center"** of marine shorefish diversity with the richest concentration of marine life on the entire planet – part of the so called Coral Triangle with Malaysia and Indonesia (Carpenter and Springer, 2005). Dr. Angel Alcala in his report on Philippine Diversity, delivered during the Foundation for the Philippine Environment's (FPE) Board of Trustees' meeting on July 15, 2006 made mention in passing of the same, Philippines as the center of center of marine diversity.

The Danajon Bank or Double Barrier Reef, located off Northern Bohol is the only double barrier reef in the Philippines and is one of the only three such sites in the Indo-Pacific region (Pichon, 1977). The overall area of the Danajon Bank is 272 sq. km. with an aggregate coastline of 381 km including 40 islands. Seventeen municipalities include the Danajon Bank within their area of jurisdiction within 4 provinces and 2 regions.

FM Ramirez, July 2006.Part of the Danajon Bank

The tasks: The July 3-9, 2006 workshop was aimed at the production of a Participatory 3-Dimensional Model of the Danajon Bank Double Barrier Reef. The whole 272 sq. km. area or nearly 30,000 ha Danajon Bank will be mapped in a 3-D scaled format measuring 3 m x 6 m in two parts at a horizontal scale of 1:16,000 and an exaggerated vertical scale of 1:5,000. This will probably be the biggest if not in Southeast Asia, in the Philippines. To further the appreciation of the importance and richness of the Double Barrier Reef showing a depth of 700 meters and a terrestrial peak at 740 masl, the 3-D model will cover 10 NIPAS sites, 7 strict nature reserves, 3 protected seascapes, more than 30 community- and municipal-based marine protected areas (MPAs) in various stages of protection.

FM Ramirez, July 2006.Computer-generated rendition of desired output

The preparation: The initial coordination for the activity started in March 2006 during a preparatory meeting held in Cebu. Ms. Becky Smith, IEC Advisor of FISH Project, Ciony Sia and GIS Specialist Raffy Martinez attended the meeting. It involved scheduling, the major preparations necessary (community consultations, venue, logistics, materials such as yarns, [ins, 4-mm cartons and most importantly the base map at the right scales depending on the desired size of the model) and other details. Another meeting followed in Quezon City with Ms. Sia and the Area Manager until finally it was agreed upon that the workshop will be held on July 3-9 in Talibon, Bohol. In between, there were e-mail consultations, exchanges and calls.

[1] A report written by Fer M. Ramirez, the 3-D modeling consultant and lead facilitator during the Danajon Bank Double Barrier Reef 3-D modeling Activity in Talibon, July 3-9, 2006.

Pre-workshop[2]. The day before the full activity, upon arrival at the site, a meeting was held between the organizers, the FISH Project especially the GIS Specialist and the Consultant. The base maps, several copies, small and the actual base map including a computer-generated 3-d rendition of the expected output were well prepared. The task then should be easy; it would only be the sheer size of the model that will be the determining factor for success. The materials, pre-cut corrugated carton boards, paints, yarns, pins, legends, brushes, tools and minor equipment up to the small details were perfectly prepared. The venue was spacious enough, solid base table for the model in place, except that there would be temporary resting tables while the manufacture is on-going. The entrance to the Interpretive Center where the model would finally lie had to be "widened", physically. Everything else was near ideal in terms of preparation.

The workshop proper and the manufacture. Day 1 started with waiting for the participants to arrive, registration, pleasantries with the LGU as a major stakeholder and other preparations. Ms. Becky Smith provided the orientation on the Danajon Bank and the significance of the activity in general while the Area Manager conducted a leveling off activity and expectations setting. None other than the Talibon Mayor, Hon. Juanario Item graced the opening ceremony by emphasizing to the participants the importance of the 3-D modeling activity and more specifically the significance of the Danajon Bank as a major threatened ecosystem. The group failed to finish the orientation proper by midday and after lunch, the consultant provided several presentations on the 3-D modeling activity and the processes involved. By mid-afternoon, the grouping of the different "assembly lines" in two modules was done.

At 3:00 PM the whole group moved to the spacious Cultural Center (covered courts) with the temporary base tables in place, materials ready and the workplace superbly organized! The contour maps were perfect, so big yet so clearly done. The bathymetric contours in blue were separate from the terrestrial printed maps. It was easy, the consultant thought. The team must be able to assemble initially the first layers with "cut outs" already before the day was done. The team had a final orientation on the "what to dos" and the "how to dos"; they had to be split in two teams led by major facilitators, the consultant and the GIS specialist. The rest of the FISH staff would be the major co-facilitators, beefed up with a very good documentor, a guy named Mar. Immediately the maps were cut and joined to match the size of the desired model (in two parts) and so were the cartons and the huge carbon (tracing) paper. Before the team retired on their first night, at least five layers of cut-out cartons were in place at the Cebu side (module 2). These were on top of a (-) 700 m depth of seabed top layer and several whole uncut layers for Bohol side (the module 1).

[2] All photos contained in this document were taken by the consultant, FM Ramirez, July 2006

Each of the carton layers is equivalent to a contour elevation of 20 meters. There was a slight problem on the quality of the glue but there were lots available locally and there was a need to alter the mixture for proper results.

Day 1 has established the enthusiasm and interest, if not the curiosity of the participants. It was delightful to see the women in serious participation during the first day.

Day 2 looked promising based on the energy and output of the first day. To the surprise of the organizers and the consultant, it was the reverse; there were missing participants. Some were reportedly tired, others had to attend to official matters in their respective offices and one has to fly Manila! That was one limitation when participants are not "secured" in the venue. The team had to re-strategize and make-do with what was available in terms of previously-trained human resources and the task at hand.

The participants were once reconvened to emphasize the tasks that each was facing over the next several days. The organizing team had to gain once again everybody's commitment, patience and cooperation. Module 2 would pursue building up the Cebu peaks to be managed by a group led by the consultant. Tracing, cutting and gluing had to commence for module 1 to be led by the GIS specialist. Module 1 would start the tedious job of tracing and cutting at minus (-) 280 m (sea depth). Each of the two module groups' facilitators had to constantly coordinate in order to see that the two sides to be joined later on would fit almost perfectly. Reference corners, orientation and elevation guides on traced and cut cartons had to be checked regularly until the "assembly line" workers had everything normalized.

Meanwhile the Cebu terrestrial component was being slowly built-up by consultant's group. The technique of putting layer after layer on a base carton so as not to lose small islands or separating peaks was explained and shown carefully by the consultant. Still, some of the pieces were missing after the whole island of Cebu was nearly finished and it was normal for beginners. The consultant had to go back to the contour map, re-trace, re-cut and glue before a final check was done. The whole process naturally registered to the participants minds, being part of the "hands on" activity. Embedding glue with nails on bulging carton layers and other details on techniques of retouching were also shown to the participants as part of trainors' training. Weights to consolidate the layers were sourced within the vicinity, and so were the tiny rock pieces to serve as final small peaks which the carton wouldn't be able to project.

While the "assembly line" was in constant motion, the consultant had to hand-pick several participants who would focus on specific tasks such as crepe-gluing, sides' consolidation with glue and crepe, tracing only and cutting only and so and so forth. That second day of mapping,

the team targeted *ground zero*. The two groups must be able to at least reach sea level (green contour line or the coastline) which meant that at least 35 carton layers had been laid on top of each other on both the two modules. Terrestrial components which had begun midday would be next and the task would be almost half-done!

FM Ramirez, July 2006. Missing parts

The core participants that day were enough to carry on the task. As the day unfolded more from the island communities arrived and those trained the previous day showed up also. ***Ground zero*** was reached before the second day ended.

FM Ramirez, July 2006. Cebu rising!

***Interesting Note**: All throughout the activity, the FISH documentor had everything captured in video (two units - a digital and a conventional one) and stills. Mar has been part of informal facilitation as well. A staff member, Kookie, is the recognized property custodian, putting all materials and equipment well managed, while others are in charge of carton-crepe management. The IEC Adviser was all hands in all phases of the manufacture and a facilitator. The GIS specialist had his eyes on maps and missing parts. There was even an artist-staff, Leslie who took charge of paint mixing, painting and training on how the total appearance of the colored model will look like. And, Ciony oversaw the whole process.*

There was a separate terrestrial contour map of Cebu prepared by the GIS specialist. Simply marvelous!

Day 3 came, this time with clear hopes of finishing on time. The plan to at least start Ubay terrestrial part the previous day was simply too much already. This would be the day for that; and building up the remaining bulk of the terrestrial component Central Bohol, where Talibon is, would start.

The day started automatically with participants proceeding to their "areas of responsibility"; but still the consultant had to do a little more cheering up and boost the enthusiasm more. That day the group would target eureka moment; the raw blank model, though very ambitious. That set the tone for everybody to be serious and very cooperative. But before we could even start, familiarity of features on the still unfinished model began registering in the minds of the participants. The moment of appreciation was beginning. They have started associating themselves with particular areas or resource features on the model. That was one of the plus factors of 3-D models as the consultant explained in his presentations. The participants have started realizing what Mr. Ramirez was advocating in terms of community maps.

In day 3, determination practically swelled. It was more like an automated factory with traced cartons piling up for the "cutters" group. The "cutters" and "gluers" groups had to split into several sub-groups. Each of the sub-groups were working on their own turfs and delivering the "goods". With the coastline reached, it was time for module 2, Cebu side, to start yarn and pin work – identifying areas of resource use, zero elevation below. The legends were shown and the process explained. Simultaneously, Cebu Island was being consolidated; Ubay was initiated by the consultant to be followed by the Central Bohol part, hopefully.

A minor concern cropped up when it was realized that the CPG island municipality (named after the Bohol-born president Carlos P. Garcia) had no contour data. Thanks to the DENR lady participant, Ephen who is a cartographer; she reproduced the contour data exact to the desired scale.

Day 4, because of the tediousness of the different tasks of in building up the terrestrial parts, the LGU of Talibon sent in more "workforce" which balanced the gender distribution of the working team. The Central Bohol part proved to be more time-consuming. The photo-series below would show how the Central Bohol came into being, as the major part of the module 1 model.

Module 1 was on its finishing touches for the other half of the raw model. By mid day, the raw model was ready for information input. The process has been explained already for the first blank and it was easy for the module 1 group to do the same. The CPG island was also taking shape together with some missing islands identified by some communities. The team had to refer back to the contour base map and even "small dots" of island were clearly identified by some community participants; otherwise their existence would be questionable.

The participants enjoyed the yarn work previously started during day 3, colorful and more analytical in terms of area and scales and familiarity of the communities with their resources. The process of discussion and consensus building were very evident. Some of the official information providers were there as well, but at the end of the day those holed in the island communities knew more. The fourth day was purely mechanical work in nature. Reiteration on the use of the legends to identify polygon-shaped areas, for module 2 and training on how to paint agreed upon areas. The raw model for module is up, painted white with little glue and termite-treatment additive.

During this 4th day, the door of the Interpretive Center had to be widened, expecting the transport of the almost finished model, the following day. The target for the day was to do painting in some information areas as much as possible, more yarn inputs in both modules and cleaning up the place. It was simply a matter of organizing work and facilitation; everything was at its best especially at the start when the maps needed to be there and the materials as well.

Day 5, target transfer of the models half-painted with full yarn information to the Interpretive Center. The *bayanihan* will be re-exhibited the Boholanos way. There was no choice, the next day was Saturday and people would be off from work. The team had to do double time without sacrificing the desired output's quality. More yarns, more painting, more discussions…. more missing islands re-built.

Yarns and paints, little re-tracing…build up…glue….

Before the group called it a day, the 3-D models, colorful and full of coded information that nobody would understand without the right legends, were on their way to the Interpretive Center.






The *bayanihan* still exists in Bohol. Finally the men-power was shown during the transfer of the models to the Interpretive Center.


The Interpretive Center: the final repository of the 3-D model… the doors and part of the wall had to be physically brought down to accommodate the map where final information inputting and finalization stages would eventually be conducted.

The next day, Day 6, more inputs… more yarns and finally the pins. Careful facilitation again had to be done for better accuracy and easier information extraction. Ms. Becky facilitated the pin information inputting.

Day 6 in details: Marine color features, pin codes, more yarns for MPAs, NIPAS sites, etc. No less than the artist Leslie, painstakingly managed the preparation of the different paint mixtures to project the (-) 10 m depth, the (-) 20 m depth, the (-) 40 m depth while the whole set of facilitators made sure that the right polygons bounded by the yarns were painted right. The results were awesome. Being a veteran of many 3-D modeling exercises, the consultant felt that this huge one was the way it should be done. It was simply amazing, the consultant was thinking.

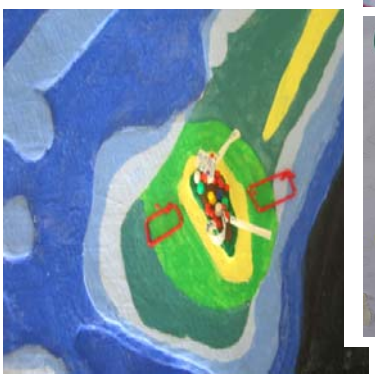
Here is a review of the 3-D model manufacture in some details, the way to Day 6:

The base map

Carton, glue and the "wonder crepe"

The paints

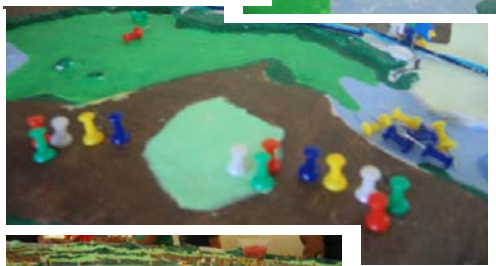



The pins

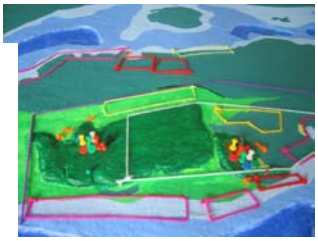




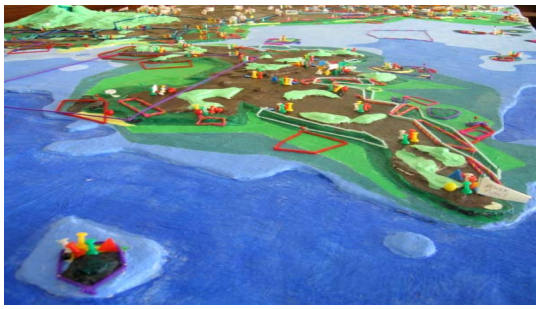



The yarns






.....and all! the product


The backbone

The organizers

The gender power

The LGU support and the participants

The recognition… and turn over

The future:

General Insights:

The sheer size of the Danajon Bank Double Barrier Reef, vast and big as it is, posed the same magnitude of challenge in producing its equally huge 3-D model. The output is probably the biggest if not in Southeast Asia, perhaps in the Philippines. The energy, the efforts and the commitment poured into the activity were simply marvelous and therefore the product is also magnificent.

The future stakeholders

What is left to do?

The 3-D modeling activity in its 7th day ended with the follow through actions necessary to complete the entire map.

While the consultant gave tips and techniques on gridding and eventually transposing and extracting information to produce updated planimetric maps, the actual activity was not undertaken primarily because of the organizers plans and objectives. This can be done once the model is completed.

As agreed upon with the stakeholders coming from the different sectors and communities:

- **More community consultations will be done to validate and enrich the information**
- **Additional pins will be needed in finalizing the label codes**
- **Informant from other parts of the Bank will be gathered to input information especially Cebu and Olango parts**
- **The two models will have to be joined and fitted according to the grids and reference points**
- **The fitted model has to rest on the more stable and sturdy platform initially prepared**
- **The acknowledgement plate together with the directional orientation plate and proper legend must be affixed onto the model**

As the consultant has always pointed out, the 3-D model is more of a means rather than an end. It is a living model that needs to be nurtured with new information; therefore it needs to be updated regularly for planning, monitoring, educational and a lot of other purposes.

To the organizers, the FISH Project, it was a great opportunity for the consultant to learn more from the unique trainors' training and modeling task.

The time is more than enough to finalize and retouch the 3-D model before the Interpretive Center opens early 2007.

Best of luck.

Fer M. Ramirez
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