Introduction to the review on the FISH Baseline Assessment Methods

We would like to commend the FISH Contractor for the good effort taken to elucidate their Baseline Assessment Plan (BAP). The DAI Independent Baseline Assessment Contract requires, as part of its Task Order, a review of the FISH contractor's BAP. This review will consider some of the conceptual constraints and scope of the contractors' approach for its BAP. This review is taken in the context of the present theory and practice on gauging effectiveness of Fishery Ecosystem Management (FEM), as illustrated by Sainsbury et al. (2000), [Fig.1] re: Review of Baseline Assessment in Fisheries, DAI & MERF November 14, 2003. Consideration of the fisheries management scales that result into effecting the target of 10% improved fisheries, is more than a semantic and technical concern. It should also be viewed in the context of how sustainable, appropriate (e.g. either socially or culturally) and equitable the potential impacts of the project will have on the fisheries ecosystem's sustainable development (see also Charles 1994 and WCPA 2002).

The range and degree of FEM interventions that the contractor employs should show their logical consistency vis-à-vis its targets (i.e. how the performance indicators either qualitatively or quantitatively demonstrate their impact relative to baseline). It is under these premises that the Baseline Contractor views the strengths and weaknesses of the Contractor's BAP. Alternatives or options for consideration by the Contractor and USAID are suggested for each of the evaluation points.

1. Local Implementation areas

- Screening criteria
  - Population size of fishing communities (i.e. significant proportion of resource users in a particular target area should be given considerable importance). Ideally this is the most logical starting point of a fisheries management project, since the objectives of fisheries management and their relevant interventions should focus on why the project is being undertaken and how the impact can be achieve both tactical and strategic results. Instead the first level of screening seems to be based primarily on practical considerations i.e. on feasibility of implementation of field activities.
    - If final selection of focal area (p.4) [priority areas was those with fisheries and coastal resources still in good condition but with a high degree of threat], what was the basis for the ranking of the candidate focal areas? It is evident that in reality the primary criterion used in screening were the criteria on operational feasibility (e.g. Surigao, Calamianes)
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*The documentation of the details of the selection process can be more properly documented (e.g. first approximation estimates from available statistics of fisher population size can be accessed and some of the scores for the habitat and resources condition can be more consistent with available information). Thus, it appears that the operational feasibility has a greater weight compared to the other criteria e.g. resource condition and exploitation patterns based on fishing population.**
** Italicize sections are proposed options for consideration*

2. Performance Indicators and Monitoring

The parameters indicated in the performance indicators in Table 6 are ambiguous. The parameters can be measured more consistently using the comparable methods and on the same sites with only time as the variable. It would help if the contractor clearly distinguishes the parameters they will use for comparison between times. CPUE of a gear obtained from fisheries dependent methods is distinct and different from the CPUE of even the same gear obtained from fisheries independent methods. The estimated CPUE from various gears and sampling design are not necessarily easily comparable unless sampling design and analytical tools are provided its clear description of scope and constraints.

- Example of method of averaging across focal areas and indicators should definitely be revised to take into account at least the following:

a. Treatment of the variances for the averages of performance indicators
   - If the means are not statistically different, is it reasonable to estimate average percentage change? It should first be established if the means are significantly different.

- Although PR1-3 estimates are all expressed as percentage, they represent percentage change of three different things (e.g. catch rate, abundance and reef fish density). Unless these percentages are converted to a common parameter, PR1-3 cannot be averaged together. Contribution of PR1-3 to the increase in biomass is not equal and thus a weighing/conversion scheme is necessary.

b. The values for PR1 and PR2 should be weighed based on relative contribution to the estimated total production for the respective fishery sector (e.g. pelagic, demersal, reef fisheries, others) and the total estimated catch in the focal area.

Alternatively, if one utilizes an ecosystem model to see the scaled effect of changes of different components or trophic groups then some handle on these contribute to the total net secondary production can be gauged.

c. PR3 based on fish density as defined, is not a sufficient indicator of improved fishery stock (see below). Estimate on increased fishery production due to protection should be scaled in relation to size of MPA relative to total reef area and potential reef fishery production in the focal area. *This indicator should be expressed in estimated biomass of target species or size frequency shifts of indicator species (i.e. fishery species) not fish abundance per 500 m^2.*

d. Indicator for improved benthic habitat also should be scaled as mentioned for PR3. Consider for example, what if in some focal areas the extent of mangrove and seagrass habitats are greater than coral reefs?

- *In view of the above, preliminary targets for each PR over life of project will need to have some revisions (i.e. Figure 6, p. 13). How subsequent adjustments in future may need to be considered in some "boot strapping" design and operational mechanisms. These adjustment procedures can be discussed in the integration workshop.*

3. Relationship among project result, performance indicators and intermediate results.

The relational diagram in Figure 7 is not clearly explained to indicate how the baseline information shows a linkage to the hypothesized effect and the indicator that will be measured (e.g. target fisheries abundance).

- For example, how will the effect of controlling blast-fishing activities in Bohol redound to the 10% improved fisheries target? It may be useful to consider how much the effect of reducing some efficiency in fishing and reduction of fishing effort lead to fisheries improvement. If baseline information on the contribution of these destructive fishing activities is derived, the reduction of effort could redound to some maintenance or growth in fisheries yield. In addition, this integrated context together with some of the other fisheries measures such as size frequency of target fisheries species and other enhancement mechanisms (e.g. grow-out in tandem with seasonal closures and gear restriction) interventions can then be gauged.
- It would be good to clarify why the Figure 7 boxes for maintenance and growth mechanisms drawn in broken lines.

- The fisheries monitoring approach requires that methodology used in the baseline assessment be repeated during each monitoring event using the same gears and targeting the same sectors of the fishery. Adjustments to this approach will need to account for shifts in the fishery (e.g. shifts in gear or composition) and when considered, should state how these adjustments could be gauged vis-à-vis countervailing effects on the other indicators. *For example, consider how increase in catch rates and fisheries yields at one time might lead to lower fisheries abundance and production.*
- *Selection of components for the fishery-independent methods should take into account its importance to the fishery of the area or its relevance to indicate the effectiveness of an intervention.*
- There is a need to monitor abundance, biomass and coral cover not only in MPA's and adjacent areas where conditions are expected to improve but also in areas that serve as

good natural controls. *The establishment of a good non-intervention control area may also be crucial or alternatively the multivariate gradient analyses (see also below, item 4 suggestion) can also be utilized for the synthesis analyses of the various PR indicators.*

- In the baseline assessment, the subsequent monitoring should be able to resolve changes in the fish stocks and *needs to be linked or attributable to a particular intervention*. This remains to be clearly explained in the baseline assessment plan where the FISH project is expected to result in an increase in marine fish stocks by 10%.
- Abundance alone based on fish densities will not accurately represent increases in the fish stocks. *The use of biomass estimates by linking abundances with size distributions of selected target species is necessary to demonstrate changes in the size of fish stocks*

The present interventions proposed may not be enough to enhance fish stocks, particularly for some sites (e.g. Surigao and Bohol) where the resources are so depleted that MPA's and effort reduction may not be sufficient. *Other enhancement measures such as reseeding or rehabilitation may be needed. MPA's can manifest its effectiveness at the ecosystem scale only if existing biomass is greater than a critical amount over longer periods of time (e.g. Russ and Alcala 1998 a&b).*

- The implications of the appropriate temporal and spatial scales important for the FEM interventions should be discussed in a greater detail. For example, in order to increase fish stocks in a typical reef area with a given size, how much of the area can be established as an MPA. Various related or parallel studies can be made or derived that can indicate the degree on how much or how realistic a particular MPA size can enhance fish stocks. Scenario building models can assist in reaching at a reasonable size of MPAs that can be targeted and can help in adaptive management through a hypothesized effect-size at the time frame of the project (i.e. till 2010)
- Overall the relationship between project interventions and proposed project indicators particularly the control mechanisms needs to be further clarified or more explicitly stated.
    - PR1 will be based on the five most important fishing gears in each area. On the other hand, PR 2 will be based on selected independent and systematic fishing operations. These are used as handles to gauge impacts. However, it is not clear what interventions will be made such that the "impacts" can be attributed to the management interventions. Will effort restrictions be effected for these gears? What specific illegal fishing activities will be addressed and what sector(s) of the fishery in a focal area will benefit from these interventions? A logical framework might be useful in elucidating these relationships and assumptions for each focal area. This should be doable after the profiling phase.
    - Likewise the relationship of the maintenance mechanisms to the growth and control mechanisms needs to be explained and discussed within context of baseline situation in each focal area.

4. Baseline Assessment Methods

For the fisheries independent methods, it is important that the contractor state *a priori* the grids that were chosen at random in each location (site). The randomization of the sampling grids reduces the bias of sampling and increases the accuracy of the measure. It is also important that measures are well replicated to increase precision and this seems to be properly addressed by the contractor.

Selection of stocks or areas to be monitored after baseline assessment should be clearly stated. These can be addressed by explicitly describing sampling design and randomization consideration procedures.

CPUE is best expressed as catch in biomass per unit effort. PR2 in Table 6 will use CPUE to indicate abundance using fisheries independent methods. This is confusing. This needs to be clarified. It is better to translate the results from fisheries independent methods to densities (expressed as biomass per unit area) to indicate levels of fish stocks. The derivation of density from results of fisheries independent methods will rely on the effective

fished area (EFA) of the gear, which may pose some difficulty for some gears such as hook and line or its variants. *The contractor may consider estimating EFA and other related strategic targeted research by providing targeted research grants for graduate students.*

For PR2 (fisheries independent methods to estimate biomass of remaining fish stocks), it is important to show the details of the sampling design and clearly indicate the grids chosen at random for sampling at an early stage. *A standard measure of effort should be decided early on. Another point is to rethink the types of fish stock (species) that needs to be targeted by some management intervention the contractor is contemplating. Then find a suitable gear that measures biomass of that stock. This way, there is a direct way to measure the effects of intervention on the sensor (target stocks). This can be agreed upon in the integration workshop.*

- For PR3 – the contribution of MPAs to the enhancement of the fish stock is theoretically the amount of fish that spills over to the reef from the MPA. Using the increase in biomass within the MPA as an indicator does not say anything about the increase in the fish stock if the amount of spillover is not quantified or put into context. *Models can be used to estimate the size of an MPA needed to increase fish stocks by 10%.*
- Deriving biomass estimates from standardized size and count observations are not indicated particularly for PR3 and should include prioritization of target species. An increase in abundance counts does not necessarily mean an increase in biomass. Studies in MPAs have shown that abundance can increase by 300-500% in the 1st two years. If this is not weighed properly in calculating FPR, the abundance increase in MPA's will dominate the estimate for FPR.

- In future, revisions to be presented in the integration workshop need to be more specific in relation to sampling design and protocols that are to be utilized should be updated. *Improvements after baseline assessment based on actual conditions on each of the focal areas would require an explicit procedure for adjustment.* For example the basis for the selection of the gears to be monitored and landing sites should clarify explicitly how the adjustments are linked to the intervention effects based on more reliable information. It is also important that the catches being monitored are from fishery production in the focal area (e.g. the Greater Coron Bay area contribution to Culion's annual fisheries yield is minor relative to the western side of Culion, i.e. from Binudac and Halsey area).
- It is probably more relevant to monitor fish abundance and biomass increase outside MPAs in randomly chosen sites as this would reflect the change in fish stocks. MPAs will result in increased abundance because fishing effort is zero but it does not represent the fish stocks nor is it available for exploitation.
- An agreement is needed to gauge the scale to measure improvement of fisheries production to determine what is the MPA's impact. *Some level of conservative spillover effect can be agreed as an initial assumption to help arrive at a reasonable scale outside the MPA that has to be measured.*
- In addition, the strategy to establish MPA's at the 4 focal areas must use lessons learned from many studies such as determination of locations and sizes (Table 9, p. 22). Choosing locations of MPAs is critical. There can be some room for improvement in the in the Baseline Assessment Plan methodology on how the *FBAT will determine (e.g. through the Focus Group Discussions or interviews) where the spawning areas, migration routes, populations of spawning stock, endangered species and other resources assessed in conjunction with the social acceptability concerns.*

- *A multidimensional and multivariate analytical approach can help illustrate whether the quantitative (10% increase in fisheries) target is achieved in the context of the scale of its effect (e.g. through a sensitivity and elasticity analysis) and its semi-quantitative relations to the other contextual system level effects.*
- *The complementation and cross checking procedure between the fishery independent technique and the catch effort monitoring derived from fish landings, boarding of fishing vessels, interviews and focus group discussions (FGD) information. Some Meta-analysis (Gurevitch and Hedges 1993) can also be undertaken to be able to consider their integrated or related effects.*

5. Next steps

The baseline contractor can utilize some of the initial baseline data and information from the four sites and analyze these to evaluate correlation trends and derive some scenarios on the effects of some possible interventions in the sites. The discussions in the integration workshop this coming 2nd week of July 2004 can look at some of the insights derived from the within site and among site analyses and intervention scenario simulation experiments. Based on the results of these analyses and simulations some agreements can be arrived at towards an adaptive baseline and monitoring approach. The DAIs review of the PMP and PFPP of the contractor shall follow after further perusal of the contractor's formal submission of their PMP and PFPP to the baseline contractor.

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