Integration of local environmental knowledge[4]

(Nigel Haggan)

There has not so far been a great deal of crossover between Local Environmental Knowledge (LEK) and scientific knowledge. This is due not so much to a lack of respect for LEK, after all, a great many scientists rely on it during their research. The problem is more one of format. Science is precise but, partly as a result of its precision, its language is generally impenetrable at the community level. With notable exceptions such as Johannes (1981), scientists have found LEK to be too diffuse, uncertain and difficult to replicate. Also, with the exception of some countries in the South Pacific, few attempts have been made to integrate LEK into fisheries management systems.

How can Ecopath, a mathematical model living in computer circuits and feeding on quantitative data help? Would it have served to have fishing community and Aboriginal community members at the November Ecopath workshop? Probably not for the reasons of format outlined above. Yet, there are parallels between Ecopath and LEK, notably that they both are more concerned with relationships, interactions and connections within an ecosystem than with achieving a deep understanding of the isolated elements. In their own way, both Ecopath and LEK are intuitive. To be successful, fishers exploiting the resources of a given area must consider an entire constellation of factors along with the potential target species: their preys and other associated species, and the weather, current, tide, phase of the moon, to name but a few. They will also compare and balance their observations on this particular fishing day with related experience on other days in the same season. To this, they will add records and recollections of previous years and the information which has been handed down to them. Similarly, when Ecopath models are constructed by a group of experts (or based on published expert knowledge handed down through the scientific literature), a number of interrelated factors must also be accommodated simultaneously, and rendered mutually compatible.

This similarity may be deep enough for Ecopath models to provide a framework for integrating LEK, and thus strike a chord at the local community level. Indeed, this integration may lead to cross-validation as in Johannes (1981), where LEK and scientific knowledge about the target species of Palauan fishers where found to be mutually compatible, and where incompatibilities led to new insights, sometimes for the fishers, but often for the scientists as well. Two approaches are suggested to test this proposition.

The first approach is to incorporate as much LEK as possible into the existing databases used as data sources by Ecopath model builders, notably FishBase (Froese and Pauly 1996). This relational database, now available in form of a CD-ROM (see McCall and May 1995), covers the fishes of the Northeastern Pacific rather well, and its 1997 release will include detailed information on the fishes of British Columbia. This database can accommodate local knowledge that is species-specific (e.g. that in Compton et al. (1994), pertaining to the role of *Catastomus macrocheilus* in the

[4] I am grateful to Rosemary Ommer for this term, which includes both indigenous knowledge and the knowledge of contemporary fishing communities.

Secwépemc/Shuswap culture), through a series of interrelated tables (Pauly et al 1993a, Palomares et al. 1993), thus enabling comparisons between LEK and scientific knowledge, and cross validation. Field and literature-based projects devoted to accumulating and encoding such knowledge, e.g., in the context of Cury's (1994) theory of site fidelity in spawning fishes, would seem particularly worthwhile, given that FishBase, once it incorporate this knowledge, could be used to disseminate it in schools, community centers, etc.

The second approach would consist of a workshop that would be convened to present an Ecopath model of a coastal area to a group of knowledgeable fishers from First Nations and the community-at-large. This workshop would begin the process of correlating local knowledge and intuitions with the relationships, data gaps and conflicts identified through the model. Without wanting to prejudge the results of such an exercise, there is little doubt that such cross validation would lead to new insights and directions for future collaboration to address, and perhaps resolve some data gaps and conflicts.

Updates on Ecopath development and applications

(Daniel Pauly and Villy Christensen)

The workshop reported upon in this report did not only generate three models of ecosystems important to the fisheries of

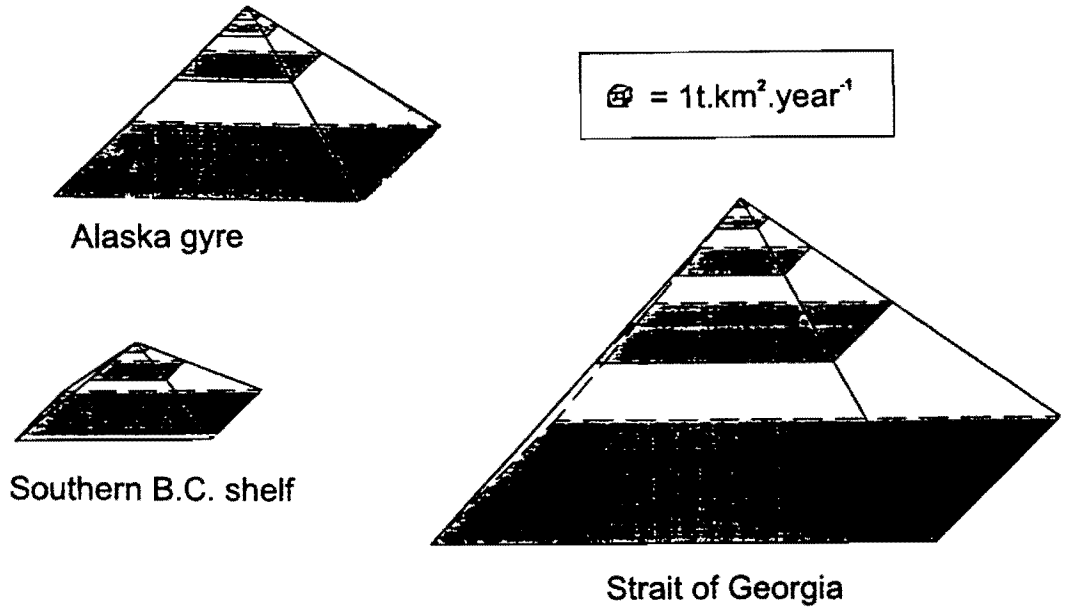

Figure 6 Trophic pyramids representing the three ecosystem models documented here. The pyramids are scaled such that the volume at each (trophic) level corresponds to the sum of all flows at that level, while the topangle is inversely related to the transfer efficiency prevailing in the system (acute angle = high efficiency). These pyramids allow direct comparisons of whole ecosystem properties.

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