Further Reading

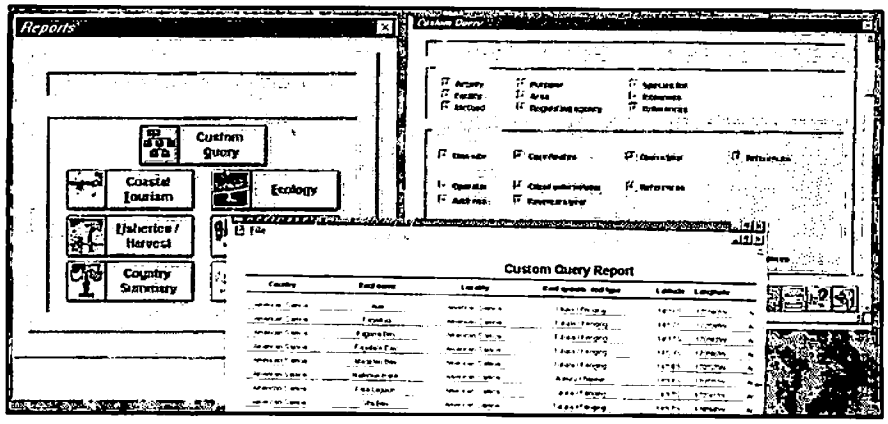
Kesner, K.N. 1996. ReefBase 1.0: a global coral reef database on CD. Naga, ICLARM Q. 19(2): 24.

Kesner, K.N. 1997. ReefBase: Accessing global data on coral reefs. Asian Diver Magazine 5(6):35-36.

Kleypas, J.A. 1995. A diagnostic model for predicting global coral reef distribution. p. 211-220. *In* O. Belwood, H. Choat and N. Saxena (eds.) Recent Advances in Marine Science and Technology. PACON Intl. and James Cook University, Townsville.

McManus, J.W. 1994. ReefBase—a global database on coral reef systems and their resources. Naga, ICLARM Q. 17(1):16.

McManus, J.W. 1997. The world's coral reefs: hope for the future. Photo essay. ICLARM, Manila, Philippines.



Reef reports including the modified flexible custom query system

McManus, J.W. and M.C. Ablan, Editors. 1996. ReefBase: a global database on coral reefs and their resources. ICLARM, Manila, Philippines.

McManus, J.W. and M.C. Ablan, Editors. 1997. ReefBase: a global database on coral reefs and their resources. ICLARM, Manila, Philippines.

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A Relational Database of Post-harvest Fish Losses

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Abstract

The article describes FISHLOSS, a database of post-harvest fish losses devised by the Natural Resources Institute (NRI) UK. The database contains 450 records of post-harvest fish losses from 150 sources. The majority of the estimates are shelf-life estimates. Designed to be a reference for people studying post-harvest fish losses, it draws attention to areas requiring future research to identify significant losses and the factors which cause them. All researchers and users are encouraged to send NRI their own estimates for inclusion in revised versions of FISHLOSS.

Introduction

Estimates vary of losses in the quality and quantity of fish caught, but there is general agreement that they are of sufficient importance to merit attempts to reduce them. The available information on post-harvest fish losses is piecemeal, and usable data-sets and analyses are often restricted to unpublished reports or are published in journals which are often difficult to access. In addition, assessment methods and data-recording techniques are by no means standardized, which makes comparisons difficult.

In an attempt to collate the reports on losses experienced by artisanal fisherfolk and to provide

a means to assess them, the Natural Resources Institute (NRI), UK has devised a database of post-harvest fish losses entitled FISHLOSS. FISHLOSS contains information taken from secondary sources as well as primary information generated by NRI from its research to develop fish loss assessment methods in Tanzania (Ward 1996a,b). The data stored include fish name, geographical location, stage in the distribution chain at which the loss occurs, the reason for the loss and the size of the loss. FISHLOSS has been developed in Microsoft® Access® software, and contains loss estimates from reports and articles as well as information from shelf-life studies. Another database (FishBase 1995) is used to standardize the fish nomenclature. NRI has also produced a manual which is designed to assist the user to input, edit and interrogate data in FISHLOSS.

At present, FISHLOSS contains approximately 450 records of post-harvest fish losses from 150 sources. These represent information from 46 countries in five continents, including marine and freshwater fisheries. So far, the majority of the estimates in FISHLOSS are shelf-life estimates. Some estimates of losses in fishing, in transport of fish and in the retail and wholesale sectors are also included.

FISHLOSS is designed to be a reference for people studying post-harvest fish losses, i.e., fishery researchers and planners. It will help policymakers and researchers to identify where the losses are significant and the possible factors that cause them. It will also draw attention to those areas where little or no research has been undertaken.

FISHLOSS can also be used as an aid in modeling exercises. For example, NRI has developed prototype models for estimating fish losses and improving decision-making. One of these models, the Quality Cost Model, focuses on costing interventions to reduce losses at the micro level, e.g., within a processing production line. The user identifies the causes of potential losses at any point and the model then predicts the costs of interventions at that point. A second model, the Predictive Macro Model, is less specific and is used to analyze interventions in the fishing industry as a whole. The value of losses at each stage of a fish marketing chain (fishing, processing, transport, retail, etc.) are calculated from available estimates of losses. The effects of interventions or policy changes, such as packing fish in ice or using a different processing method, can then be evaluated (Cheke and Ward, in press).

Updating a database of this sort is a continuous process. Users are encouraged to send NRI their own estimates for incorporation into revised versions of FISHLOSS (with appropriate recognition of the data suppliers). Updated read-only versions of FISHLOSS may be released at intervals. The methods of release have not yet been decided but publication via the World Wide Web might be appropriate.

Design

The original intention was to design a database in which the marketing chain could be followed from fish capture to retail sale and the losses recorded at each point. However, data with the required degree of detail are not available from the literature. The majority of fish loss studies have recorded losses at a single stage so that it is not yet possible to partition losses to different stages in the same distribution chain. However, if any such information is available it can be included in a section for notes.

The losses table, the main table in FISHLOSS, contains codes to identify the data sources referring to the losses, the nomenclature of the fish involved, the geographical location at which the loss was recorded, as well as quantitative estimates of the losses themselves and the main reason for the loss.

The losses table is linked to other tables which also contain these codes and define in greater detail the fish name, the geographical location at which the loss was recorded and the source of the data. Since FISHLOSS has a relational structure (Fig. 1), these details only have to be entered once. The links between the tables mean that details like the nomenclature of a fish species may be referred to many times in different loss records but will only have to be entered once. Details of the value of a loss, if available, are stored in the losses-finance table.

Each loss record also has an associated record in one of the other tables, such as fishing details, process details, transport details and storage details, depending on the stage in the distribution chain at which the loss was recorded. These tables contain information such as the duration of the stage and temperature which affect the degree of loss observed. They correspond to the sectors for which separate loss assessments were carried out by Ward (1996 a,b) and have also been used in the modeling exercises linked with this database (Cheke and Ward, in press).

One of the main problems encountered in constructing FISHLOSS was how to allow for the different levels of detail in the data, and the different ways in which losses have been defined. In re-

cent work in Tanzania, Ward (1996a,b) classified losses as either physical (when fish had to be thrown away) or financial (associated with a reduction in quality when fish had to be sold at a reduced price). This classification is used in FISHLOSS and losses can be entered as the percentage reduction (by weight) in quality or quantity. Actual weights can be entered together with details of the value of quality and physical losses. It is also possible to enter the total value of losses, as many studies have not distinguished between physical and quality losses, or as a percentage of the number of fish losing quality which is a common means of assessing fish losses, rather than as the percentage lost by weight.

In many cases information on location may be restricted to the name of the country and whether the fishery was marine or freshwater. In other cases the town or village name may be known. The location table therefore contains a number of different fields, from continent down to coordinates, so that the location can be specified at the level of detail available. A location such as Lifuwu on Lake Malawi, Africa, is then entered as a different location from Lake Malawi, Malawi, Africa where the village or town name is not specified. Similarly, for fish nomenclature, for example, *Carangoides armatus* is a different record in the fish table from *Carangoides*. To prevent ambiguity, all nomenclature (with the exception of local names) has been standardized to that of FishBase, a database of worldwide fish biology and taxonomy (FishBase 1995). Where identity is not known at the species level, a name in English or in the appropriate local language, which distinguishes fish of the same genus or family, is entered in the local name field.

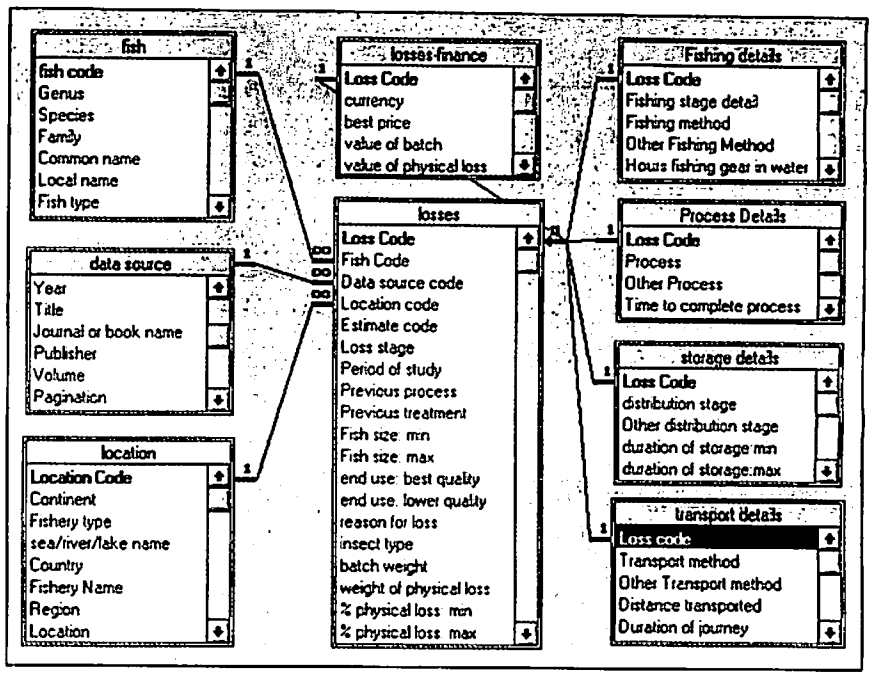


Fig. 1. The primary tables in the database and their relationships. The 1 to ∞ links between tables indicate that the same data source, fish or location records may be referred to many times in the losses table. The 1 to 1 links indicate that each loss record may be referred to once in each of the linked tables.

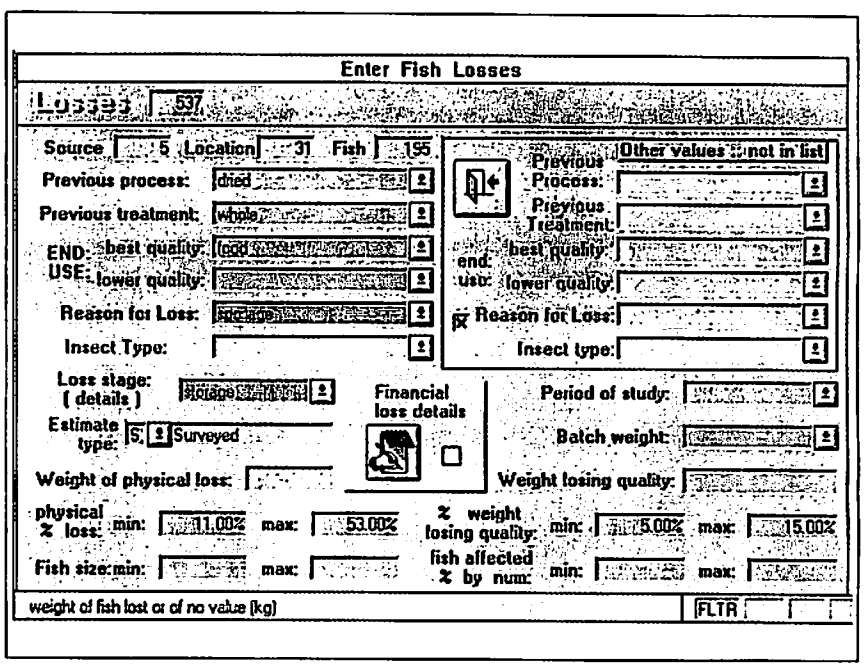
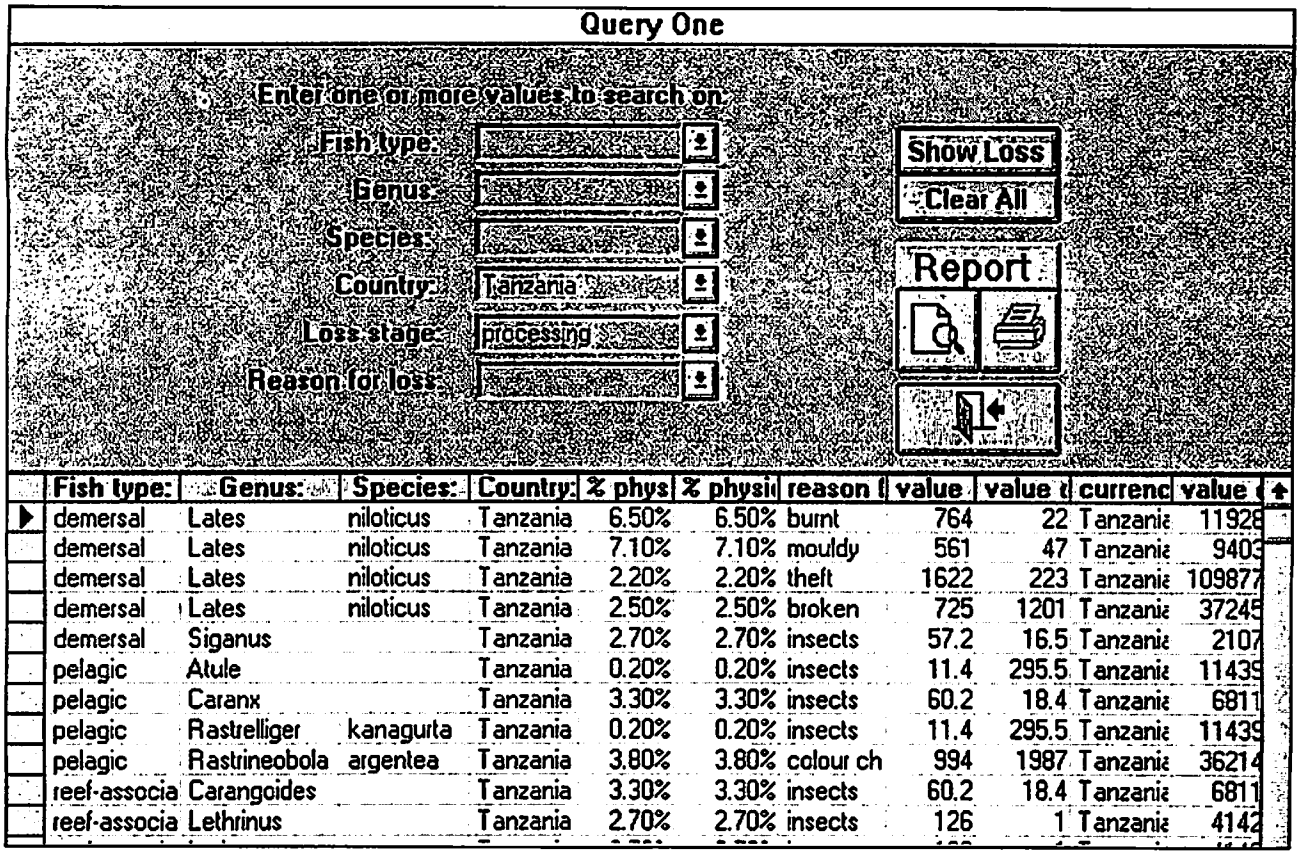


Fig. 2. Form to enter loss estimates.

FISHLOSS has a data entry system which allows entry through a form system ensuring that the correct fields are completed and that the entry to certain fields is limited to a given list of options (Fig. 2). There is also a facility for checking data and editing individual records once they have been entered, facilities for interrogating the losses data through



Fish type:	Genus:	Species:	Country:	% phys	% physi	reason f	value	value t	currenc	value
demersal	Lates	niloticus	Tanzania	6.50%	6.50%	burnt	764	22	Tanzania	11928
demersal	Lates	niloticus	Tanzania	7.10%	7.10%	mouldy	561	47	Tanzania	9403
demersal	Lates	niloticus	Tanzania	2.20%	2.20%	theft	1622	223	Tanzania	109877
demersal	Lates	niloticus	Tanzania	2.50%	2.50%	broken	725	1201	Tanzania	37245
demersal	Siganus		Tanzania	2.70%	2.70%	insects	57.2	16.5	Tanzania	2107
pelagic	Alule		Tanzania	0.20%	0.20%	insects	11.4	295.5	Tanzania	11439
pelagic	Caranx		Tanzania	3.30%	3.30%	insects	60.2	18.4	Tanzania	6811
pelagic	Rastrelliger	kanagurta	Tanzania	0.20%	0.20%	insects	11.4	295.5	Tanzania	11439
pelagic	Rastrineobola	argentea	Tanzania	3.80%	3.80%	colour ch	994	1987	Tanzania	36214
reef-associa	Carangoides		Tanzania	3.30%	3.30%	insects	60.2	18.4	Tanzania	6811
reef-associa	Lethrinus		Tanzania	2.70%	2.70%	insects	126	1	Tanzania	4142

Fig. 3. Some results from a query on losses in the processing sector in Tanzania.

a series of forms, and a facility for printing reports from these queries. Using the Losses Query form (Fig. 3), losses can be selected according to fish, country, loss-stage or reason for loss. Queries for each loss stage can also be selected from a menu to view details specific to a particular stage such as fishing or transport methods. The Data Entry, Data Edit and Query forms are easy to use and do not require a knowledge of Access® or database structures.

FISHLOSS is part of the NRI's general development of loss assessment tools, the development of "standardized" loss assessment methods (Ward 1996a, b) and the development of models to analyze fish losses. Research will continue in West Africa to validate these tools. FISHLOSS is now in a form that can be tested by potential end-users, with whom NRI is trying to establish links. Readers who are interested in helping to develop the database by providing data or by testing the prototype version may contact the authors.

Acknowledgments

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References

Cheke, R.A. and A.R. Ward. 1997. Modeling post-harvest fish losses. Naga, ICLARM Q. (In press).

FishBase. 1995. FishBase: a biological database on fish. Ver. 1.2. CD-ROM, ICLARM, Manila, Philippines.

Ward, A.R. 1996a. Quantitative data on post-harvest fish losses in Tanzania. The fisheries of Lake Victoria and Mafia Island. Unpublished Report, Natural Resources Institute, Chatham, U.K.

Ward, A.R. 1996b. Methodologies for assessing post-harvest fish losses. INFOFISH Intl. 5:44-51.

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