



RECOFI Technical Workshop on Spatial Planning for Marine Capture Fisheries and Aquaculture Doha, Qatar 24–28 October 2010



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Draft RECOFI Regional Spatial Planning for Marine capture fisheries and Aquaculture Survey

Summary of results and analysis

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Section 1. Country needs for GIS, remote sensing and/or mapping for marine capture fisheries and aquaculture (Table 1A)

- **Huge positive response (100%) to the need for GIS.**
- **Most countries have necessary funding to start GIS work.**
- **In 75% of RECOFI countries there are trained personnel available.**
- **Very few countries (12%) presently practicing appropriate fisheries or aquaculture GIS work.**
- **All countries would require a specially designed GIS.**
- **All countries said that GIS could be added to present IT functions.**

Country needs for GIS, remote sensing and/or mapping for marine capture fisheries and aquaculture (Question 1.1)

- ◎ **The range of spatially related problems identified by countries was fairly large. For example, in aquaculture important problems were:**
 - aquaculture zoning
 - identifying appropriate sites
 - areas of stress (pollution, disease, algal blooms, etc)
 - sources of freshwater
 - land limitations for aquaculture
 - lack of spatial data

Country needs for GIS, remote sensing and/or mapping for marine capture fisheries and aquaculture (Question 1.1)

- ◎ **In capture fisheries the important problems were:**
 - **Recording problem zones (red tides, shipping, dredging, etc)**
 - **lack of stock assessments**
 - **distribution of species**
 - **collecting data on artisanal fishing catches and effort**
 - **illegal fishing and unreported catches**
 - **land-based disturbances (ports, development, pollution, etc**
 - **knowledge of habitat and ecosystems distributions**
 - **destruction of important habitats (coral, mangroves, etc)**
 - **identifying marine conservation zones**
 - **trans-boundary stocks (plus little recognition of EEZ's)**
 - **excess fishing capacity**
 - **lack of reliable spatial data.**

Section 1. Country needs for GIS, remote sensing and/or mapping for marine capture fisheries and aquaculture (Question 1.2)

- ◎ **The roles that GIS might reasonably play were seen as:**
 - Viewing changes over time
 - Correlation analyses (relationships between data sets)
 - Aquaculture zoning and management
 - Gaining information on fish distributions
 - “follow the growth rates of fish culture”
 - Gain a knowledge of marine ecosystem interactions
 - Formation of integrated coastal management systems
 - “develop databases for capture fisheries”
 - “improve resource assessments”
 - Support decision makers in achieving sustainable development
 - “spatial database generation”
 - Site suitability mapping
 - “generation of maps and other spatial information”

Section 1. Country needs for GIS, remote sensing and/or mapping for marine capture fisheries and aquaculture (Question 1.3)

- ⊙ Thematic areas for GIS that are seen as high priority include:
 - “fisheries and marine resources”
 - “freshwater resources”
 - Fishing ground information
 - Site selection for marine protected areas
 - “coastal zone management”
 - “freshwater areas for aquaculture development”
 - Fishing vessel monitoring systems
 - “hydrological layers (drainage, sewage, etc)”
 - “land use cover”
 - Management of marine living resources

Section 1. Country needs for GIS, remote sensing and/or mapping for marine capture fisheries and aquaculture (Question 1.4)

- ⊙ Additional data required for fisheries or aquaculture GIS:
 - “any data related to the marine environment”
 - Employment, income, ecological, environmental data
 - Area available for fish farming
 - Amount of harvested fish from different farms
 - Movement of fish species at various life stages
 - Spawning sites and nursery grounds
 - Hydrographic and bathymetric profiles
 - “fishing ground data”
 - Fishing vessel monitoring data
 - Statistical data related to CPUE and fish abundance
 - “meteorological data”

Section 1. Country needs for GIS, remote sensing and/or mapping for marine capture fisheries and aquaculture (Question 1.5)

Every RECOFI country said that GIS will have a strong impact on the information needs for fisheries and aquaculture in their country.

(Question 1.6)

- ◎ Five RECOFI countries noted that they had alternative (probably additional) sources of supplying their data needs, e.g. from:
 - The coastguard or divers
 - A local web-based portal
 - Personal communications
 - From environmental or meteorological organisations
 - Military surveys
 - Private companies

Section 1. Country needs for GIS, remote sensing and/or mapping for marine capture fisheries and aquaculture (Question 1.7)

Seven RECOFI countries said that their fisheries personnel might need advanced training in GIS, though five countries also said that basic training would be necessary.

(Question 1.8)

- Half of the RECOFI countries thought that reliable external GIS advice was available from sources such as:
 - Local universities or research institutes
 - Various web-sites
 - National cartographic centres (or centres for GIS)
 - Local GIS consultants
 - The FAO

Section 1. Country needs for GIS, remote sensing and/or mapping for marine capture fisheries and aquaculture (Question 1.9)

Each RECOFI country had recognised an organization or institution who might lead on any fisheries or aquaculture GIS work. These were mostly government departments such as Ministries of Agriculture, Fisheries, Environment, Protection of Marine Resources, Resource Development, etc.

Section 2. Spatial issues in marine capture fisheries in your country (Table 2)

This section sought to find out the extent to which GIS was being used for various issues relating to marine capture fisheries. Some brief observations include:

- For 70% of the issues GIS was not used at all; for 28% of issues it was 'little used'. This is an overwhelming illustration of the current very limited GIS use.
- It was most used for either 'Ecosystems and environment' or for 'Communication purposes'.
- Only in Oman and to a lesser extent Bahrain was GIS being 'more widely' used.
- Only Qatar appeared not to use GIS at all.
- We detected evidence that GIS may have been previously used in some countries but that it is no longer being used.
- There was almost no evidence of GIS being used in most of the main categories that it could/should be used for, thus there is a huge potential to increase its use.
- We detect that data deficiencies are a major cause for lack of GIS use.

Section 3. Spatial issues in aquaculture in your country

- ⦿ **GIS training and promotion of GIS**
 - Training (LU: Iraq, KSA)
 - Promotion (LU: KSA)
- ⦿ **GIS aimed at the development of aquaculture**
 - Suitability of site and zoning (LU: Bahrain, Iran, Oman)
 - Strategic planning for development (LU: Bahrain)
 - Anticipating the consequences of aquaculture
 - Economics (LU: Iraq)

Section 3. Spatial issues in aquaculture in your country (Continued)

- ◎ **GIS for aquaculture practice and management**
 - Inventory and monitoring of aquaculture and the environment (LU: Oman, KSA)
 - Environmental impacts of aquaculture (LU: Bahrain)
 - Restoration of aquaculture habitat (LU: Bahrain)
 - Web-based aquaculture information system (LU: Bahrain, KSA)
- ◎ **GIS for multisectoral development and management that includes aquaculture**
 - Management of aquaculture together with fisheries
 - Planning for aquaculture among other uses of land and water (LU: KSA)

Section 3. Conclusions on spatial issues in aquaculture

- Overall, of the 12 spatial sub-issues in aquaculture Bahrain and KSA address five, Iraq and Oman two each, and Iran one while there other countries, Kuwait, Qatar and the UAE are not yet employing GIS to address spatial issues.
- Importance of issues varies among countries according to state of development of mariculture
- Questions arising:
 - Awareness of benefits of GIS and RS to address issues?
 - Commitment to using GIS and RS to address issues?

Section 4. Spatial capacities

- ⦿ Media of datasets
 - Maps and documents on paper are available in all countries except the UAE
 - Bahrain, Iran, and Oman are the only countries that have digital geographic data
 - Oman and KSA are the only countries with remote sensing data
- ⦿ Hardware
 - Basic equipment to support GIS is available in all countries except the UAE

Section 4. Spatial capacities (continued)

- Remote Sensing and GIS Software
 - All of the countries with the exception of the UAE have the recent ESRI GIS software
 - Bahrain, Iran IR and Iraq have mapping software
 - Iran IR, Iraq, Oman and KSA have specialized software for analysis of remotely sensed data.
- Access and storage of data
 - Data are stored on workstations in all of the countries except the UAE
 - Bahrain, Iran IR, Qatar and KSA also have centralized storage capabilities.
- Data sharing
 - Networked within institutions; external sharing via the Internet

Section 4. Spatial capacities in the respective fisheries and aquaculture departments in your country

- Spatial capacities were assessed in the following ways:
 - Media of existing datasets
 - GIS hardware
 - GIS and remote sensing software for analysis and storage
 - Access to and storage of GIS and remote sensing data
 - Data sharing within and among institutions

Section 4. Spatial capacities

○ Analysis

- All of the countries except the UAE possess basic equipment and the same ESRI software in common
 - Data sharing and data analysis are thus facilitated among countries
- Freeware a possibility for the UAE
- Easy access to the Internet is a essential
 - Many kinds of spatial data useful to mariculture are freely downloadable
 - The internet as the basic link for communications (RAIS) and data transfer among institutions and countries

Section 5. Constraints to adopting spatial planning and management tools (Table 5)

This question asked for the constraints that countries experienced in implementing spatial planning for fisheries or aquaculture. The main findings are:

- There is little surprise that 75% of RECOFI countries have insufficient knowledge of GIS or RS for Fisheries-based work, or that 87% found lack of data to be a constraint.
- All countries noted the lack of skilled GIS expertise.
- Half the RECOFI countries indicated experiencing hardware constraints – these were typically the smaller countries.
- 75% of countries noted constraints regarding forming partnerships. We suspect that this type of cooperative working is not normal, though it should be developed.
- It is worrying that five countries perceived constraints posed by their institutions or governing bodies.

Section 5. Constraints to adopting spatial planning and management tools (Table 5 – cont.)

- ⦿ **Half of the countries had concerns over the legal framework.**
- ⦿ **We found it surprising that ONLY half of the countries had a problem with identifying the main spatial issues, and similarly that only half had a problem with “the availability of GIS and RS models”.**
- ⦿ **Again, only half of countries experienced a problem of understanding the need to interact with other sectors.**

Section 6. Linkages and cooperation

- The following topics relating to linkages and cooperation were a part of the questionnaire:
 - Stakeholders using marine space which might be willing to cooperate in spatial planning for aquaculture and fisheries
 - Agencies with GIS capacity
 - Means of access to data

Section 6. Cooperation in spatial planning

- The kinds of entities for which cooperation is possible:
 - Fishery research institutes (Iran IR, Kuwait)
 - Fishermen's cooperatives or organizations (Iran IR, Iraq)
 - University departments (Iran IR, Iraq, Oman, Qatar)
 - Remote sensing centers (Iran IR, Kuwait, Qatar)
 - Land use or planning agencies (Iran IR, Iraq, Kuwait, Qatar)
 - Conservation agencies (Iran IR, Kuwait, Oman, Qatar)
 - Private companies (Iran IR, Iraq, Kuwait)
 - (no data from Bahrain and the UAE)

Section 6. Cooperation and GIS capacity

- Entities apart from fisheries and aquaculture with GIS capacity:
 - Qatar (4)
 - KSA (3)
 - Bahrain and Kuwait (2)
 - Iran IR and Iraq (1)
- Capacity is in a variety of institutions including remote sensing centers, university departments, conservation agencies and private companies
- Means to access data is possible as a matter of policy in Bahrain, Iran, Iraq, Kuwait, Oman, and Qatar
- There are opportunities for cooperation in spatial planning among a variety of agencies among the respondent countries that should be pursued in several important realms including training, data sharing, and joint projects.

Section 7. Funding support/opportunities

- Funding support and opportunities were considered in the following ways:
 - Financial opportunities to support GIS capacity improvement according to sources
 - Adequacy of support
 - Incremental funding required if support was inadequate
- Three kinds of financial opportunities to support GIS capacity improvement were considered:
 - Internal government funding (Bahrain, Iraq, Iran IR, Kuwait, Oman, Qatar, KSA, UAE)
 - Special funding/projects (Bahrain, Iran IR, Oman)
 - Foreign assisted projects (Iran IR, Iraq)

Section 7. Funding/support opportunities (continued)

- Funding support was considered:
 - Adequate by Iraq, Kuwait, Oman
 - Uncertain by Qatar and Bahrain, Iran IR, KSA and UAE
- ***Analysis***
- It is encouraging that all of the countries have opportunities for funding from internal government sources
- In three countries internal funding might be coupled with special funding including for projects (Bahrain, Iran IR, Oman)
- Only two countries would couple internal funding with foreign assisted projects (Iran IR, Iraq)

Section 8. Research and publications (Table 8A)

- It was unsurprising that five of the RECOFI countries had no fishery or aquaculture research activities relating to GIS or RS. However, we suspect that other research work has been done but it is not recognised here.
- Question 8.3 asks whether countries “have” regular publications (journals, newsletters, etc) of relevance to GIS or RS. Three countries reported positively but this could simply mean that they subscribe to relevant publications (rather than produce them).
- With respect to ‘finding out about’ fisheries or aquaculture GIS/RS we drew attention to attending workshops or conferences, and Table 8B provides a short list of these relating to RECOFI countries.

Section 9. Training opportunities (Table 9)

- ◎ It is unsurprising that only 3 countries offer post-graduate training in spatial planning relative to fisheries or aquaculture. We suspect that this training may not be related to these subjects directly but that students could choose projects related to fisheries or aquaculture.
- ◎ 75% of countries had formal non-degree courses related to GIS/RS and again we suspect that these are general and not fisheries related courses. There appears to be many types of such course available.
- ◎ All RECOFI countries reported a high level of interest in undertaking relevant GIS/RS training, and most countries also reported a high level of need for such courses.

Section 10. Additional information