Abstract: The Flanders Marine Institute has taken the initiative to build an integrated information tool, called IMIS. The objective of this database is to provide information on all topics relevant to marine sciences - be it people with their expertise, institutions and their mandate, publications, etc. Different types of 'knowledge items' correspond to different modules in the system, each with their own entry into the database. These modules are (currently): Persons, Institutes, Literature, Journals, Conferences, Projects and Datasets. IMIS version 1.0 (accessible at: http://www.vliz.be/vmdcdata/Imis/index.htm) is in operation and the VMDC (Flanders Marine Data and Information Centre) schedules a new enhanced version in 2002.

Introduction

The Flanders Marine Institute, VLIZ was established in 1999. One of its primary goals is to provide the necessary tools for coordinated marine research in Flanders. The VMDC (Flanders Marine Data and Information Centre) has some more specific objectives, within this framework:

- To provide data and information to researchers, public authorities and other interested parties, in a suitable and prompt way
- To stimulate networking and to maximally centralise the nationally and internationally available data of research groups and governmental authorities
- To develop and maintain databases for interdisciplinary research, according to the established international standards
- To integrate various kinds of data, and perform consistency and quality controls

VMDC took the initiative to build a system, called IMIS (Integrated Marine Information System), with multiple functionalities. Its main goal is to map the marine-scientific landscape in Flanders in its totality.
But how did this idea come up?

**Historical development**

In May 2000, VLIZ decided to build an online information system, mainly based on the large literature collection the institute inherited from two former marine-scientific institutes.

In a first phase we looked at several commercially available cataloguing programmes. Soon we realised that cataloguing software is an excellent tool to store and retrieve information on titles available on library shelves. But records in a library catalogue do not tell us where the authors work, we cannot find out in what subject fields they are active, we do not know anything about their colleagues, and we cannot ask them for this information, as any contact data (address, e-mail, telephone) are missing.

In a second phase we started looking for software that could present all these variables in an integrated, concise format. Surprisingly, not much came up. What we found were still more library catalogues and many many software tools that could present us splendid directories of all kinds. Still, not one developer apparently had looked into the possibility of linking these two concepts into a brand new one: presenting all the different data sets in one interface!

This diagnosis, and the fact VLIZ had the inhouse expertise, led us to a drastical solution: building the whole product ourselves!

First, we agreed on some very important basics.

- The developed product should be as compatible as possible with other currently used platforms, and database programmes.
- The record structure should be compliant with the ASFIS-structure (**Aquatic Sciences & Fisheries Information System**). This was necessary as one of the VLIZ objectives is to become the ASFA Input Center for Belgium.
- The finished product will be distributed freely to all interested parties, especially in developing countries, with the objective to enable an international information network based on the same system everywhere.
- All data and information in the information system should be accessible to all users without thresholds; this meant implementing a web-based interface.
- Finally, the developed database should be an open system, without any thresholds to source codes, to make changes and improvements possible where and when needed.

The road we have chosen did mean hard work. As with any new product, problems come up at the least expected time and place, and a lot still needs to be done. However, after one year of hard thinking, programming, testing, refusing, restarting, hoping and with a
lot of cooperation and good humour, we were able to implement a first version of our ‘integration idea’. IMIS 1.0 was born.

**Technical description**

**IMIS**

Integrated Marine Information System

As explained already, IMIS is intended to be an integrated management system for a variety of information and data sources. The current system enables the management of:

- Library catalogue
- Directory of scientists and institutions
- Catalogue of research projects
- Metadata of ocean data sets
- Database of conferences and events

The integrated approach allows for cross-referencing between the information sources e.g. the Author field in the bibliographic database crosslinks to a record in the directory of scientists.

**TECHNICAL SOLUTION DESCRIPTION**

IMIS is developed as an SQL-server relational database system running on a MS NT server. For web serving the Apache 1.3.9 web server software is used. Accordingly cgi-bin applications were developed in VBasic 6.0 and the library CGI VB 1.4 (Kevin O’Brien, 1996).

For data entry, forms were developed in MS-Access, linked to the SQL-server database using ODBC.

**TECHNICAL REQUIREMENTS**

**CONFIG 1:** Less than 10 simultaneous users

- Database engine: In this case SQL-server is not required and can be replaced with MSDE that is included in MS-Office Professional 2000 (but is not installed by default).
- Data entry: MS-Access 2000
- OPAC: web server. Currently tested only with Apache web server (v. 1.3.9)

**CONFIG 2:** more than 10 simultaneous users

- Data entry: MS-Access 2000
- OPAC: web server. Currently tested only with Apache web server (v. 1.3.9)
Note: it is possible to develop an IMIS system with another RDBMS (eg ORACLE, mySQL, Filemaker) if the RDBMS is ODBC compliant. However, this has not been tested and additional engineering work may be required.

LIBRARY MANAGEMENT MODULE

The current IMIS library module allows for catalogue management only. In order to allow for possible collaboration with ASFA as an ASFA input centre, IMIS uses the ASFIS (ASFISIS-3) record structure and scroll-lists (controlled vocabulary) such as ASFA Thesaurus, ASFA Geographic Descriptors, ASFA Journal Title Monitoring List. VLIZ decided not to use the ASFA Taxonomic Authority list because it is too limited. VLIZ is considering the use of the ITIS Taxonomic Reference list (as is the case also for ASFA).

An IMIS bibliographic record allows for 3 levels: analytic, monographic and serial. An interesting advantage of the relation structure is that e.g. for 20 chapters of a book, the monographic information needs to be entered only once in IMIS, whereas ASFISIS will require 20 duplicates.

IMIS allows for the generation of a user notification when new records have been created in the catalogue.

IMIS plans to add several library functions in the near future:

PATRONS
- add/edit patron info
- patron groups and rights
- address labels

CIRCULATION
- charge/discharge/renew item to patron
- reserve/unreserved item for patron
- notifications

ORDERS
- create/update/receive order

SUPPLIERS
- create/edit supplier

Also SERIALS CONTROL will be added (verify arrival of serials and generate warnings of non-arrival)
IMIS LIBRARY MODULE: TECHNICAL INFO

Vlizlit.mdb is started up in Access on the workstation:

Authors: reference list of authors (surname, first name, initials)
Journals: list of all journals and of the library holdings of these journals
Requests & Loans: library management tools
Duplicate Authors: checking tool to eliminate duplicate input
Person match: linking author names to person name in Persons-module
Special collections: enables identification of eg donated collections or specific bibliographies
**Journals**: main entry form to enter bibliographic descriptions

Basic mandatory fields are situated in the main section. Several tab-sheets allow data input related to the specific bibliographic form of the record:

- **Analytic**: relation to the source publication
- **Abstracts**: English abstract and original language abstracts when available
- **Keywords**: Thesaurus, geographical terms, taxonomic terms and free keywords are added here as needed
- **Description**: standard description of physical features and general content description
- **Address**: corresponding author’s address
- **Special collection**: enables identification of e.g. donated collections or specific bibliographies

**Publications**: main entry form to enter bibliographic descriptions
Main form and Analytic tab-sheet

Publication Form

BibID: 21018
In library: Yes
Public: Yes
Approved for distribution: Yes

English Title: New evidences on the marine Holocene in the western Belgian coastal plain

Language title: English
Translated by input centre

Author: Baeteman, C

Analytic
Abstracts: 
Keywords: 
Description: 
Address: 
Spec. Coll.: 

Analytic ID: 17167

Publication Date: 1970
Volume: 07
Issue: 1
Pagination: 49-54
Book/Monograph: 

Record: 1975
of 19216
Abstracts tab-sheet

Investigations in the coastal plain yielded new data regarding the stratigraphy of the marine Holocene and the evolution of the plain during the Atlantic and Subboreal periods. Formerly it was accepted that the Calas sediments were deposited during one single transgression. However, at least four distinct transgressions were found belonging to the Calas Member. By means of 14C dating, the development of the western coastal area is briefly reconsidered.

Keywords tab-sheet

<table>
<thead>
<tr>
<th>Thesaurus terms</th>
<th>Taxonomic descriptors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holocene sediments</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Geographic descriptors</th>
<th>BbOtherDescriptors:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANE, Belgium</td>
<td></td>
</tr>
</tbody>
</table>
### Description tab-sheet

<table>
<thead>
<tr>
<th>Environment</th>
<th>Marine</th>
<th>Brackish</th>
<th>Freshwater</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document type</td>
<td>Journal article</td>
<td>Phys. medium</td>
<td>Paper</td>
</tr>
<tr>
<td>BIBNotes:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literary styles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Languages</td>
<td>English</td>
<td>Summary</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Summary</td>
<td></td>
</tr>
</tbody>
</table>

### Address tab-sheet

| Address | Belgische Geologische Dienst
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Address1</td>
<td>Jennerstraat 13</td>
</tr>
<tr>
<td>Address2</td>
<td>po-1100 brussels</td>
</tr>
<tr>
<td>Country</td>
<td>Belgium</td>
</tr>
<tr>
<td>Phone</td>
<td></td>
</tr>
<tr>
<td>Fax</td>
<td></td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:cecile.besteman@mineco.fgov.be">cecile.besteman@mineco.fgov.be</a></td>
</tr>
</tbody>
</table>

45
The current web-based OPAC is quite basic allowing for searching in Title, Author, Initials (of author name), Abstract or Title word, Word in any field, Publication year and Acquisition date.


Abstract

The composition of the diet of 14 fish species that were common in beach seine catches over the seagrass beds of Gazi Bay (Kenya) was investigated. Three trophic guilds could be distinguished based on dietary diversity and on the numerical and grammatical composition of the diet: Herklotsichthys quinquimaculatus, Stolephorus indicus and Athrinomorus duxdecimars were planktivores. Their stomach fullness index was low and the diet was not diverse. The main food items were harpacticoid and calanoid copepods and brachyuran zoeas and magalopae. Apogon thermis, Fowleia aura, Paramonoconethus barnardi, Myrtilloides lavacolus, Lutjanus fulviflamma, L argentinacuclatus and Gernes acromis were benthiivores, mainly feeding on small epif- and hyperbenthic prey. Their diet was very diverse and it was dominated by Amphipods (Gammaroidea), Tanacidae and Mysidae. Their fullness indices were low, but a little bit higher than those observed for the planktivores. A third group were the 'piscivores': Bothus argus, Fistularia commersonii, Sphyraena barracuda and Pterodactylus argenteus. The dominant items in the food spectrum of these species were postlarval fishes and large nektic invertebrates (gammaroidea amphipods, mysids, shrimp and crabs). Their diet was not diverse and the fullness index was much higher than that of the other species examined. All other species caught were further classified according to the following feeding guilds: herbivores, planktivores, benthiivores (epif- and hyperbenthivores) and piscivores. The ichthyofauna of Gazi Bay was clearly dominated by benthiivores.

Author(s)

- De Troch, M.
- Mees, J.

In cases where a 'directory of scientists' record exists the user can click on to see the full description of the selected author:
From here it is possible to click through to full information on the institution, to see what projects the researcher is working on, or to go back from here to a list of papers
Universiteit Gent (RUG): Vakgroep Biologie: Afdeling Mariene Biologie

Institute: Universiteit Gent (RUG)
Level 2/Department: Vakgroep Biologie
Level 3/Lab: Afdeling Mariene Biologie
Type: Scientific

Address
Postal address: K.L. Ledeganckstraat 35
B-9000 Gent
Belgium
Phone: +32-9-304 52 31
Fax: +32-9-304 53 44
Email: insde.OceamDrup.ac.be
URL: [url]

People
- Bastin, Katryn
- Breael, Bregje
- Boga, Wendy
- Boga, Gem
- Calcoen, Peter
- Christiaens, Bijsheba
- Chrest, Veerle
- Cluet, Belgia
- Dejon, Maria Hennina
- Camel, Wim
- De Backer, Wim
- De Brabander, Els
- De Dene, Dina
- De Meester, Lies
- De Ridder, Benjamin

[URLs and other information]

51
Flanders Marine Institute

IMIS - Project details

Ecologie van copepoden: structurele en functionele biodiversiteit in tropische zeegrasvelden

<table>
<thead>
<tr>
<th>Short name</th>
<th>Biodiversiteit van copepoden in zeegrasvelden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference number</td>
<td>1128697N</td>
</tr>
<tr>
<td>Sponsor</td>
<td>Fonds voor Wetenschappelijk Onderzoek - Vlaanderen</td>
</tr>
</tbody>
</table>

Institutions and Scientists

- Universiteit Gent (RUG), Vakgroep Biologie, Afdeling Marine Biologie
  - De Troch
Flanders Marine Institute

IMIS: Literature


For a monograph series, the separate monographs in the series are listed
For a monograph in a series, the series information is displayed
Separate records for chapters in a monograph are also listed
Parts of monograph


In the Conference module information on conferences and symposia is listed:

**Flanders Marine Institute**

**IMIS: Conference details**

**Studiedag: 'Beheer van kust en zee: beleidsondersteunend onderzoek in Vlaanderen'**

Organizers: Vlaams Instituut voor de Zee (VLIZ)
City/Place: Th斯顿 Palace, Ostende
Country: Belgium
Begin date: 11/9/2001
End date: 11/9/2001
E-mail address: info@vliz.be

Website: [http://www.vliz.be](http://www.vliz.be)

Again, if Proceedings have been published, the references are listed in IMIS:

**IMIS: Details of publication**

**Beheer van kust en zee: beleidsondersteunend onderzoek in Vlaanderen: Studiedag, Oostende, 9 november 2001.** [Coastal and marine management: policy supporting research in Flanders: Symposium, Oostende, 9 November, 2001.]


**Availability:** Present in the library

**Language original title:** Dutch

**Language publication:** Dutch

**Author(s):**
- Mees, J. ([Editor])
- Seys, J. ([Editor])

**Monograph information**

**Publisher:** Vlaams Instituut voor de Zee (V.U.Z.)

**City:** Oostende, Belgium

**Volume in series:** 4

**Conference:**

**Title:** Studiedag 'Beheer van kust en zee: beleidsondersteunend onderzoek in Vlaanderen'

**Organizer:** Vlaams Instituut voor de Zee (V.U.Z.)
The Projects module contains data regarding current and finished projects:

**IMIS - Project details**

**Biotic interactions in turbid estuarine systems.**

**Short name:** Biotic interactions in turbid estuarine systems

**Reference number:** GO10989N

**Period:** 1/1999 - 12/2002

**Sponsor:** Fonds voor Wetenschappelijk Onderzoek - Vlaanderen

**Description:** Study of the relative importance of primary production, bacterial production and detritus aeration for the planktonic foodweb. Biotic interactions in the micro- and macrobenthic foodweb. Feeding behaviour of macrocrustaceans, fish and birds.

This project aims to contribute to a better understanding of the structure and function of estuarine food webs by studying selected biotic interactions in the plankton and benthos of the Scheldt estuary (The Netherlands, Belgium).

**Objectives:**
1. The study of the relative importance of primary production, bacterial production and detritus aeration for the planktonic foodweb.
2. The study of important biotic interactions in the micro- and macrobenthic foodweb.
3. The study of the feeding ecology of higher trophic levels (fish, macrocrustaceans and avifauna) and their impact on lower trophic levels.

**Institutions and Scientists**

- Universiteit Gent (UG): Vakgroep Biologie, Afdeling Protozoologie en Aquatische Ecologie  
  - Veerman
- Universiteit Gent (UG): Vakgroep Biologie, Afdeling Marine Biologie  
  - Ydeux
- Instituut voor Natuurbaden  
  - Miere
- Katholieke Universiteit Leuven, Departement Biologie, Laboratorium voor Aquatische Ecologie  
  - Olibter
- Vlaamse Universiteit Brussel (VUB): Vakgroep Biologie, Laboratorium voor Ecologie en Systematiek  
  - Dries
- Vlaamse Universiteit Brussel (VUB): Vakgroep Schoonheid, Laboratorium Analytische en Milieux Technieken
Again, links are available to the involved Institutes and persons:

Universiteit Gent (RUG): Vakgroep Biologie: Afdeling Protistologie en Aquatische Ecologie

Institute: Universiteit Gent (RUG)
Level/Department: Vakgroep Biologie
Type: Scientific
Address:
Postal address K.L. Leuvenkantstraat 35
8000 Gent
Belgium
Phone: +32-9/364 52 00
Fax: +32-9/364 53 44
Email: Wim.Voermans@rug.ac.be

People:
- De Clercq, Victor
- Cercy, Christine
- Clijsters, Sabine
- Dausselas, Remi
- De Groot, Lieve
- De Graef, Vanessa
- Van Peer, Sue
- Mertens, Koenraad
- Sieck, Leen
- Van Der Heijden, Kathleen
- Van Wichelen, Jan
- Vanhaute, Koenraad
- Vanmelen, Pieter
- Veirens, Eline
- Voermans, Nael
Again, from these screens, access is given to all other modules, e.g. Persons

IMIS: Details on Person

Muylaert, Koenraad

Initials: K

Institute

Vakgroep Biologie, Ateliers Protozoologie en Aquatische Ecologie

Postal address

K.L. Ledeganckstraat 36
B-9000 Gent
Belgium

Phone
+32-9/364 52 09
Fax
+32-9/364 53 44
EMail: Wim.Vynsman@rug.ac.be

Publications in IMIS: List

Project(s)
- A study of the carbon flux through the microbial food web in aquatic systems: experiments and modelling.
- Structuur en dynamiek van microplankton-gemeenschappen in het Schelde estuarium (Bazel, Nederland).
Finally, a list of available datasets is also presented, (experimental to date)

The good, the bad and the future

Very quickly, the marine community in Flanders started using the new information system. From the beginning people highly appreciated the integrated presentation of marine information. One single access point (the web-interface of IMIS) provided all answers to the FAQ of our marine researcher: who, where, what, when, with whom, why? Coming from a situation where one had to spend days and weeks to gather this kind of data (by phone, fax, letters, personal communication, etc.), this new tool was a long-awaited asset.

Soon enough, however, some weak points in the system became visible:

- An integrated information system gives the user an impression of completeness, but the input of data remains an intensive, relatively slow process. So, many names, addresses, core publications and other important data are still missing.
- At the level of integration of the different modules, some obvious links were missing (e.g. the merging of publication lists of an author, publishing as Prudhoe, J. and Prudhoe, J.R.M.).
• Solutions were needed to link on line full text documents to records in the databases on a permanent basis.
• A solution was needed to link references to a printed article, as well as to the same article published on a CD-ROM (or on another physical form).
• Users notified us of the need for a two-way information management: identified remote users must be able to manage and add information to the system, and have the ability of extracting data and references in a personalised format.

All these problems and other flaws of the system needed to be resolved, as well on the level of data gathering, input management as database structure and functionality. So the decision to write version 2 of IMIS was an obvious one.

However, as IMIS 1.0 proves to be a widely used and appreciated tool within the Flemish marine community, we can give the necessary time and attention to the writing and implementing of this new version. Due to the fact IMIS already exists and works, the Flemish marine community is rapidly moving towards a similar model of coordination and structural contacts, as well with VLIZ as with each other. The massive feedback we receive from all users proves that the tool was needed, but also that is it far from perfect, and needs a lot of attention to grow into a strong valuable information tool. We believe this is possible, and that integrated information management will be the best choice for the future.