生態元數據語言
EML標準介紹

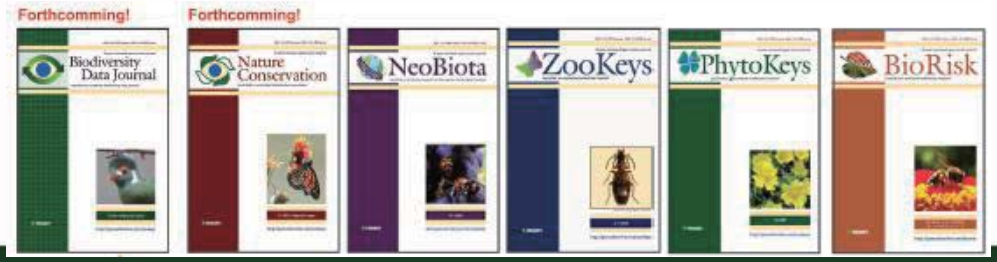
林業試驗所生態資訊學研究室　王豫煌

為何要倉儲資料？

- 穩定完善保存資料，促進資料的再利用，提升資料的價值
- 長期、大尺度的議題需要資料的共享與整合，資料倉儲可以作為促進研究合作的平台
- 資料發表 (data publishing)、資料報告 (data paper)、資料引用 (data citation)

Publishing data papers
– data provider get reward from data publishing

- A new creature in the biodiversity world: the data paper (http://blog.datadryad.org/2011/06/03/a-new-creature-in-the-biodiversity-world-the-data-paper/)
- PenSoft data publishing guideline (http://www.pensoft.net/page.php?P=23)
- International repositories of data
  KNB (http://knb.ecoinformatics.org/index.jsp) GBIF (http://www.gbif.org/)
  Dryad (http://www.datadryad.org/)



ESA Ecological Archive

http://esapubs.org/archive/archive_D.htm

Data Papers

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Ecology index
Index to *Ecological Archives* in *Ecology* listed by volume number.

Ecological Monographs index
Index to *Ecological Archives* in *Ecological Monographs* listed by volume number.

Ecological Applications index
Index to *Ecological Archives* in *Ecological Applications* listed by volume number.

Ecosphere index
Index to *Ecological Archives* in *Ecosphere* listed by volume number.

The Bulletin index
Index to *Ecological Archives* in *Bulletin of the Ecological Society of America* listed by volume number.

Data Papers
Index to Data Papers listed by volume number.

Data Registry
Register data to announce its existence.

Instructions
Instructions for preparing digital archives for submission.

Contacts
Contacts for *Ecological Archives*.

FAQs
Frequently asked questions on file preparation.

Author index
Index through 2008 to *Ecological Archives* listed alphabetically by first author's last name.

Copyright and Permissions
Information on copyright and permissions.

Citation instructions
Instructions on how to cite *Ecological Archives*.

Usage and Format
Instructions on usage and format requirements.

Log of corrections
A chronological log of corrections made to *Ecological Archives*.

ESA Journals
Information on ESA journals.

Home
Ecological Archives Home Page.

Data papers, supplements, and digital appendices for ESA journals

What does *Ecological Archives* publish?

Ecological Archives publishes materials that are supplemental to articles that appear in the ESA journals (*Ecology, Ecological Applications, Ecological Monographs, Ecosphere, and Bulletin of the Ecological Society of America*), as well as peer-reviewed Data Papers with abstracts published in the printed journals. *Ecological Archives* is published in digital, Internet-accessible form. Three kinds of publications appear in *Ecological Archives*: Appendices, Supplements, and Data Papers. Ability to publish appendices and supplements in *Ecological Archives* allows authors to shorten the paper version of a manuscript without withholding germane material not essential for understanding the paper. It also allows authors to make available substantial amounts of supporting material such as methodological details, data tables, graphs illustrating additional analyses, photographs, additional references, and supplemental discussion, all as citable entities.

Appendices in *Ecological Archives* are directly viewable (or executable in the case of sound or video) with a standard web browser. They are self-contained; all critical supporting materials are present in the caption, footnotes, or are in the associated original article. These supporting materials will typically take the form of tables, graphs, or photographs. Authors of field studies are encouraged to submit a photograph(s) of their study site for inclusion as a digital appendix.

Supplements can include, but are not limited to, original and derived data sets, source code for simulation models, and software for unusual statistical analyses. Authors are encouraged to submit supplements so as to facilitate new analyses of their data, as well as validation of analyses already conducted. Appropriate metadata are required and must be provided in a standard format. Materials previously submitted to the ESA Supplemental Publication Service from 1981 through 1997 are treated as Supplements, but without requirement for strict conformance to current metadata standards.

Data Papers are compilations and syntheses of data sets and associated metadata deemed to be of significant interest to the ESA membership and the scholarly community. Data papers are peer reviewed and are announced in abstract form in the appropriate print journal as a Data Paper. Data papers differ from review or synthesis papers published in other ESA journals in that data papers normally will not test or refine ecological theory. Data Papers can facilitate the rapid advancement of ecological knowledge and theory at the same time that they disseminate information. In addition, *Ecological Archives* provides a reward mechanism (in the form of peer-reviewed, citable objects) for the substantial effort required to compile and adequately document large data sets of ecological interest.

So as to encourage authors to keep their printed papers short, ESA does not charge fees for publication in *Ecological Archives* of appendices and supplements that cumulatively total less than 10 MB. For more information on publication fees see Financial Arrangements. *Ecological Archives* is publicly available, free of charge.

Data Registry — In addition, all authors are encouraged to register their data at ESA's official Data Registry at: data.esa.org

The Data Registry simply serves to announce the existence of data and to provide contact information. By registering data, one does not relinquish rights to research findings. In fact, the registry may serve to establish precedence for ecological studies. Our hope is the the Data Registry will eventually be linked to data archives containing the actual data referred to in the registry, and that all data underlying published papers in ESA journals will be readily available for purposes of verification, replication, and meta-analysis.

ESA Publications | 127 W State Street | Suite 301 | Ithaca, NY 14850-5427 | phone 607-255-3221 | email esa_journals@cornell.edu

ESA Ecological Archive

http://esapubs.org/archive/archive_D.htm

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ECOLOGICAL SOCIETY OF AMERICA esa Ecological Archives

Data Papers for 2011

Hechinger, Ryan F., Kevin D. Lafferty, John P. McLaughlin, Brian L. Fredensborg, Todd C. Huspeni, Julio Lorda, Parwant K. Sandhu, Jenny C. Shaw, Mark E. Torchin, Kathleen L. Whitney, and Armand M. Kuris. 2011.
Food webs including parasites, biomass, body sizes, and life stages for three California/Baja California estuaries.
Ecology 92:751.
Ecological Archives E092-066.

Raymond, Ben, Michelle Marshall, Gabrielle Nevitt, Chris L. Gillies, John van den Hoff, Jonathan S. Stark, Marcel Losekoot, Eric J. Woehler, and Andrew J. Constable. 2011.
A Southern Ocean dietary database.
Ecology 92:1188.
Ecological Archives E092-097.

Pélissier, Raphaël, Jean-Pierre Pascal, N. Ayyappan, B. R. Ramesh, S. Aravajy, and S. R. Ramalingam. 2011.
Twenty years tree demography in an undisturbed Dipterocarp permanent sample plot at Uppangala, Western Ghats of India.
Ecology 92:1376.
Ecological Archives E092-115.

Stevens, Carly J., Cecelia Dupré, Edu Dorland, Cassandre Gaudnik, David J. G. Gowing, Martin Diekmann, Didier Alard, Roland Bobbink, Emmanuel Corcket, J. Owen Mountford, Vigdis Vandvik, Per Arild Aarrestad, Serge Muller, and Nancy B. Dise. 2011.
Grassland species composition and biogeochemistry in 153 sites along environmental gradients in Europe.
Ecology 92:1544.
Ecological Archives E092-128.

Anderson, Jed, Lance Vermeire, and Peter B. Adler. 2011.
Fourteen years of mapped, permanent quadrats in a northern mixed prairie, USA.
Ecology 92:1703.
Ecological Archives E092-143.

Lucas, Cathy H., Kylie A. Pitt, Jennifer E. Purcell, Mario Lebrato, and Robert H. Condon. 2011.
What's in a jellyfish? Proximate and elemental composition and biometric relationships for use in biogeochemical studies.
Ecology 92:1704.
Ecological Archives E092-144.

Armbruster, Georg F. J., Manuel Schweizer, and Deborah R. Vogt. 2011.
A database on visible diurnal spring migration of birds (Central Europe: Lake Constance).
Ecology 92:1865.
Ecological Archives E092-157.

Rooney, Rebecca C., Suzanne E. Bailey, and Dustin Raab. 2011.
Plant community, environment, and land-use data from oil sands reclamation and reference wetlands, Alberta, 2007–2009.
Ecology 92:2003.
Ecological Archives E092-170.

Mulder, Christian, and J. Arie Vonk. 2011.
Nematode traits and environmental constraints in 200 soil systems: scaling within the 60–6000 µm body size range.
Ecology 92:2004.
Ecological Archives E092-171.

Thieltges, David W., Karsten Reise, Kim N. Mouritsen, John P. McLaughlin, and Robert Poulin. 2011.
Food web including metazoan parasites for a tidal basin in Germany and Denmark.
Ecology 92:2005.
Ecological Archives E092-172.

Mouritsen, Kim N., Robert Poulin, John P. McLaughlin and David W. Thieltges. 2011.
Food web including metazoan parasites for an intertidal ecosystem in New Zealand.
Ecology 92:2006.
Ecological Archives E092-173.

Zander, C. Dieter, Neri Josten, Kim C. Detloff, Robert Poulin, John P. McLaughlin, and David W. Thieltges. 2011.
Food web including metazoan parasites for a brackish shallow water ecosystem in Germany and Denmark.
Ecology 92:2007.
Ecological Archives E092-174.

Thibault, Katherine M., Sarah R. Supp, Mikaelle Giffin, Ethan P. White, and S. K. Morgan Ernest. 2011.
Species composition and abundance of mammalian communities.
Ecology 92:2316.
Ecological Archives E092-201.

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如何倉儲資料？

- 完整描述資料內容及資料欄位定義 (meta-data)
- 採用國際通用資料交換標準 (standard)
- 使用資料編輯及倉儲工具 (tools)

如何描述資料

元數據(METADATA)

何謂元數據(Metadata)?

- Meta
  - after, beside, between, beyond, or with
- Metadata:
  - Information about data
  - Data description
  - Data about data

“higher level information that describe the content, quality, structure, and accessibility of a specific data set”

Michener et al., 1997

Metadata – Structure Standardized

計畫題目:生命條碼應用在墾丁海域仔稚魚之物種鑑定(NSC 95-2621-B-001-010-MY2)

計畫主持人：邵廣昭

摘要：利用生命條碼方法，只需採取一小塊組織，就可輕易鑑定從卵到成體的各個不同的生活史時期的生物標本……

關鍵字:生命條碼

<title>生命條碼應用在墾丁海域仔稚魚之物種鑑定(NSC 95-2621-B-001-010-MY2)**</title >**

<givenName>廣昭**</givenName>**

<surName>邵**</surName>**

<abstract>利用生命條碼方法，只需採取一小塊組織，就可輕易鑑定從卵到成體的各個不同的生活史時期的生物標本……**</abstract>**

<keyword>生命條碼**</keyword>**

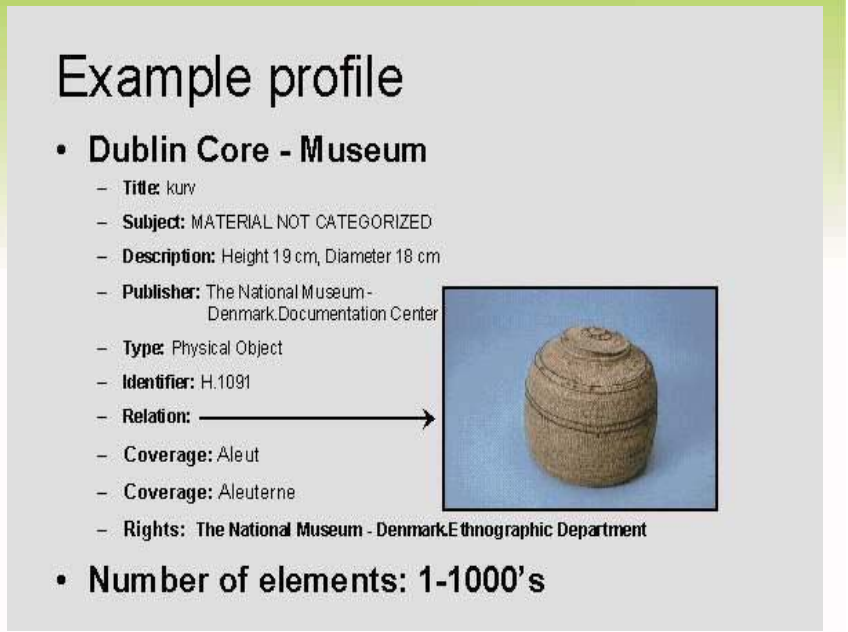
metadata 文件可被人類解讀也可用電腦交換

一些 Metadata 世界標準

- FGDC Metadata Standard
- NBII Biological Data Profile
- ISO Metadata Standard

Others:

- Dublin Core
- Darwin Core
- Global Change Master Directory
- Global Information Locator Service
- National Environmental Data Referral Service
- Ecological Metadata Language (EML)



Ecological Metadata Language
元數據標準 (EML)

EML 的發展目標

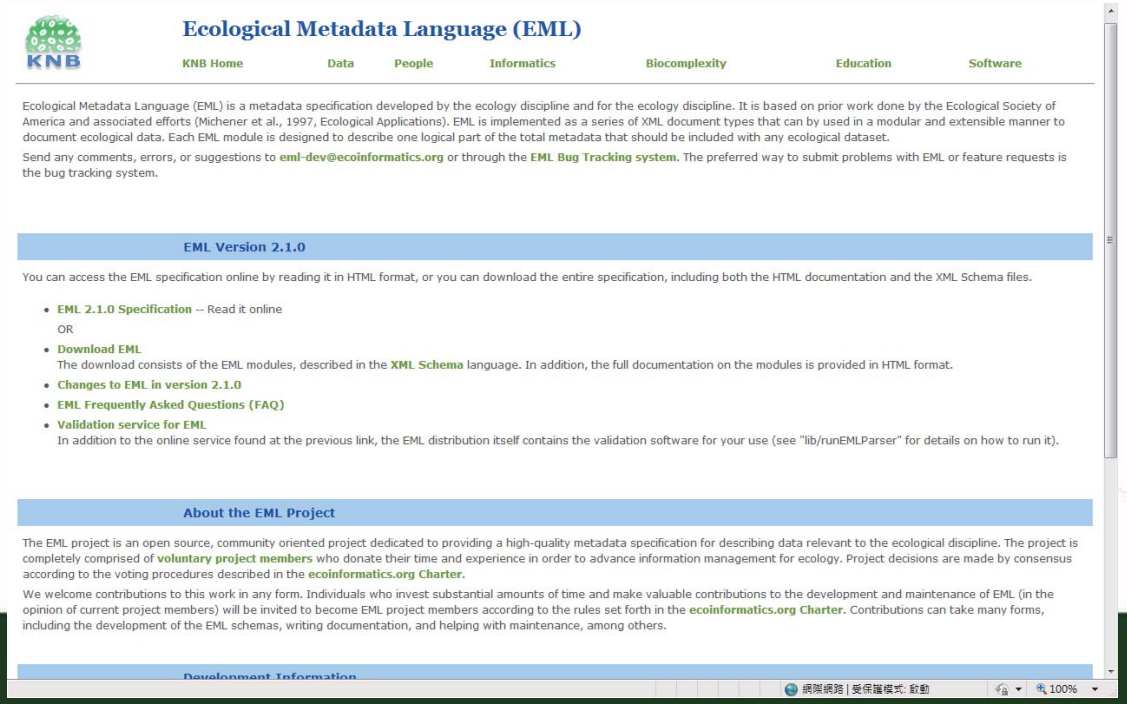
- 數據與元數據文件有遵循的標準
- 人與電腦皆可讀懂的語言
- 確保資料的長久保存
- 促進資料發現與取得
- 促進資料的分享與整合
- 擴大生態學資料的長期利用性

EML 的特色

- 模組化的標準可視需要增減
- 可以整合現有的其他標準
- 已有完整的共享工具
- 已經被資訊工程界承認
- 已成為世界生態研究交換的標準

EML 的公開平台

- Open Source project, welcomes contributions
- Developed by members of the community eml-dev@ecoinformatics.org
- Currently at Release 2.1.0，Releases of EML are downloadable: http://knb.ecoinformatics.org/software/eml/



KNB

Ecological Metadata Language (EML)

KNB Home | Data | People | Informatics | Biocomplexity | Education | Software

Ecological Metadata Language (EML) is a metadata specification developed by the ecology discipline and for the ecology discipline. It is based on prior work done by the Ecological Society of America and associated efforts (Michener et al., 1997, Ecological Applications). EML is implemented as a series of XML document types that can by used in a modular and extensible manner to document ecological data. Each EML module is designed to describe one logical part of the total metadata that should be included with any ecological dataset.

Send any comments, errors, or suggestions to **eml-dev@ecoinformatics.org** or through the **EML Bug Tracking system**. The preferred way to submit problems with EML or feature requests is the bug tracking system.

EML Version 2.1.0

You can access the EML specification online by reading it in HTML format, or you can download the entire specification, including both the HTML documentation and the XML Schema files.

- **EML 2.1.0 Specification** -- Read it online
  OR
- **Download EML**
  The download consists of the EML modules, described in the **XML Schema** language. In addition, the full documentation on the modules is provided in HTML format.
- **Changes to EML in version 2.1.0**
- **EML Frequently Asked Questions (FAQ)**
- **Validation service for EML**
  In addition to the online service found at the previous link, the EML distribution itself contains the validation software for your use (see "lib/runEMLParser" for details on how to run it).

About the EML Project

The EML project is an open source, community oriented project dedicated to providing a high-quality metadata specification for describing data relevant to the ecological discipline. The project is completely comprised of **voluntary project members** who donate their time and experience in order to advance information management for ecology. Project decisions are made by consensus according to the voting procedures described in the **ecoinformatics.org Charter**.

We welcome contributions to this work in any form. Individuals who invest substantial amounts of time and make valuable contributions to the development and maintenance of EML (in the opinion of current project members) will be invited to become EML project members according to the rules set forth in the **ecoinformatics.org Charter**. Contributions can take many forms, including the development of the EML schemas, writing documentation, and helping with maintenance, among others.

Development Information

網際網路 | 受保護模式: 啟動 100%

EML 2.1.0 的模組

- eml
- eml-access
- eml-attribute
- eml-constraint
- eml-coverage
- eml-dataset
- eml-dataTable
- eml-entity
- eml-literature
- eml-methods
- eml-party
- eml-physical
- eml-project
- eml-protocol
- eml-resource
- eml-software
- eml-spatialRaster
- eml-spatialReference
- eml-spatialVector
- eml-storedProcedure
- eml-text
- eml-unitTypeDefinitions
- eml-view

EML的完整性標準與等級(1/4)

- 完整性可分為五個等級
  - 基本可辨識
  - 資料可被發現
  - 資料可被搜尋
  - 資料可被擷取
  - 資料可被整合
- 本研習說明國科會所稱資料繳交以第5級資料可被整合為準，並依此等級進行資料繳交後之檢誤與審核。

EML的完整性標準與等級(2/4)

完整性等級	與規範內容項目對應
等級1: 基本可辨識	(1)題目(Title) (2)摘要(Abstract) (3)關鍵字(Keywords) (4)擁有者(Owner)資訊 (5)研究合作個人或機關(Associated Parties)資訊

EML的完整性標準與等級(3/4)

完整性等級	與規範內容項目對應
等級2: 資料可被發現	等級1再加上下列項目： (6)聯絡人(Contacts)資訊 (7)使用權(Usage Rights)
等級3: 資料可被搜尋	等級2再加上下列項目： (8)研究計畫資訊： 研究與取樣方法(Methods) 時間範圍(Temporal Coverage) 地理範圍(Geographic Coverage) 分類範圍(Taxonomic Coverage)

EML的完整性標準與等級(4/4)

完整性等級	與規範內容項目對應
等級4: 資料可被擷取	等級3再加上下列項目： (9)數據表欄位名稱 (10)數據表欄位定義 (11)數據類型
等級5: 資料可被整合	等級4再加上下列項目： (12)原始數據檔

倉儲內容項目

元數據與原始數據內容項目(1/2)

- 計畫內容元數據內容項目
  - 題目(Title)與摘要(Abstract)
  - 關鍵字(Keywords)
  - 人員與組織：擁有者(Owners)、聯絡人(Contact)、合作組織或團隊(Associated Parties)資訊
  - 研究計畫資訊
    - 是否為大型計畫之子計畫
    - 使用權(Usage Rights)
    - 地理範圍(Geographic Coverage)
    - 時間範圍(Temporal Coverage)
    - 分類範圍(Taxonomic Coverage)
    - 研究與取樣方法 (Methods)
    - 存取資訊(Access Rules)

元數據與原始數據內容項目(1/2)

- 原始數據(raw data)內容項目
  - 原始數據表的元數據
    - 數據欄位名稱
    - 數據欄位定義
    - 數據類型：
      - Nominal、Ordinal：描述與定義
      - Interval、Ratio：標準單位、精確度、數字型態與值域
      - Date-Time：格式、精確度與值域
  - 原始數據檔

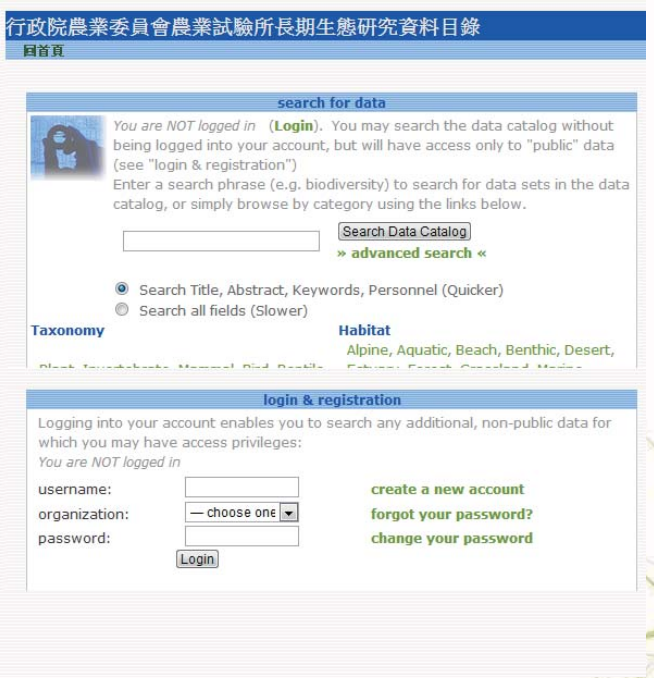
編輯、管理工具及倉儲平台

Morpho

- Metadata editor

Metacat

- Data archiving system



敬請指教~