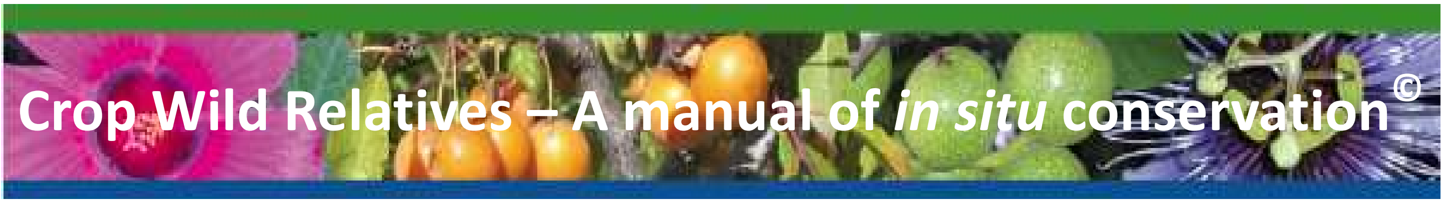

Establishing an information baseline: ecogeographic surveying

WHAT IS AN ECOGEOGRAPHIC STUDY?

An ecogeographic study is a process of gathering and synthesizing ecological, geographic and taxonomic information. The results are predictable and can be used to help formulate conservation strategies and collecting priorities.

Source - Maxted, N., van Slageren, M.W. and Rihan, J.R. (1995) ‘Ecogeographic surveys’, in Guarino, L., Ramanatha Rao, V. and Reid, R. (eds), Collecting Plant Genetic Diversity. Technical Guidelines, pp 255–287, CAB International, Wallingford, UK

Before any conservation action can be undertaken, as much information about the target species as possible needs to be gathered to make appropriate decisions when developing a conservation strategy.

An ecogeographical study aims to determine:

1. Distributions of particular species in particular regions and ecosystems;
2. Patterns of infra-specific diversity; and
3. Relationships between survival and frequency of variants and associated ecological conditions.

Gathering of desktop *in situ* information

Data may be gathered from a range of sources:

- Literature (Floras, monographs, checklists etc.)
- Herbaria
- Botanic gardens and arboreta
- Passport data from gene banks
- National/local meteorological service data sets
- National Soil Survey and data sets
- National biodiversity reports and conservation strategies
- International, regional and national biodiversity databases and information systems.

Desktop information may need to be supplemented by field exploration and field data to gather information on ecology, demography, genetic variation, breeding system and so on.

CREATING A KNOWLEDGE BASELINE

The knowledge baseline brings together a wide range of information about the target species.
Elements needed for knowledge baseline include:

- Information on the species use in the country/region, with a focus on the correct identity; distribution; reproductive biology; breeding system; demography; and conservation status.
- Information on how these species are used, including local traditional knowledge.
- Information on the nature and extent of trade in these species.
- Information on the extent to which (if relevant) the species are harvested from the wild and the consequences of this on the viability of wild populations.
- Information on the species’ cultivation and propagation.
- Information on the species’ agronomy if cultivated.
- Information on which of them occur in protected areas.
- Information on the availability of germplasm and authenticated stock for cultivation.
- Ecogeographic conspectus for each species.

Source - Heywood, V.H. and Dulloo, M.E. [2006 (2005)] ‘*In situ Conservation of Wild Plant Species – a Critical Global Review of Good Practices,*’ IPGRI Technical Bulletin, no 11, FAO and IPGRI, International Plant Genetic Resources Institute (IPGRI), Rome, Italy.

TAXONOMIC INFORMATION

Correct identification of the taxa being surveyed or selected for conservation is essential. This may be difficult as the level of accuracy of identification of plant taxa in scientific literature often varies and may be quite low. There is no universal agreement on how to define a species and there are at least eight different species concepts in use. A conventional taxonomic species concept based primarily on morphological differentiation is likely to be used for identifying target species. The nomenclature adopted in the country's standard Flora(s) should be followed, unless it is found to be incorrect.

The problem of **synonymy**, whereby the same taxon (species, genus etc.) occurs in the literature and herbarium under more than one name, can be problematic. A plant may have more than one name because: it has been described independently more than once by different taxonomists; a species is later shown to be the same as an earlier published species; or a species is treated by different taxonomists at different ranks, such as subspecies, or variety, or is placed in different genera by different specialists.

The use of **common names** should be exercised with caution as many taxa have several which are often locally specific but not unique over larger areas[1].

1 - Kanashiro, M., Thompson, I.S., Yared, J.A.G., Loveless, M.D., Coventry, P., Martinsda-Silva, R.C.V., Degen, B. and Amaral, W. (2002) 'Improving conservation values of managed forests: the Dendrogene Project in the Brazilian Amazon', *Unasylva,* vol 53, no 209, pp 25-33.

Sources of taxonomic information

- **International electronic databases** and **Floras** such as TROPICOS and Species 2000.
- **National, local and specialized databases**.
- **The Global Biodiversity Information Facility** (GBIF): a global network of data providers that builds biodiversity information infrastructure and promotes the growth of biodiversity information content on the internet: http://www.gbif.org/.
- **Herbarium specimens** - it should also be remembered that there is no guarantee that the material is correctly identified or bears the correct name.

Practical hints - dealing with taxonomy and names

- If a species has a different name form in a Flora or on a herbarium specimen than the one you recognize, remember this does not necessarily mean it is a separate species – it may just be a synonym of that species.
- Remember the names given to species in the literature may be incorrect.
- If you cannot find a species in a particular Flora or handbook, consider whether it may actually appear under a different name (synonym) or in a different genus.
- If you are unable to identify a specimen, prepare a herbarium sample to take to a taxonomist for identification. Make sure that it has flowers and, if possible, fruits.
- If in doubt, consult with a taxonomist for assistance or advice.

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GENETIC VARIATION

Genetic variation occurs at various levels within species' populations; for CWR, particular alleles may provide the basis of valuable traits for future breeding programmes. In order to capture the desired amount of genetic variation, a detailed understanding of the structure of the genetic variation occurring in a species and its populations is required.

It is unlikely that genetic information for many species will become available in the near future due to the costs and labour involved. As such, other methods may be utilized, including the use of morphological differentiation and genecological zonation[2].

Biochemical and molecular techniques have also been developed for the study of genetic variation, such as isozyme analysis and DNA-based techniques.

2 - Theilade, I., Graudal, L. and Kjær, E. (2000) 'Conservation of the Genetic Resources of Pinus merkusii in Thailand', DFSC Technical Note 58, Danida Forest Seed Centre (DFSC), Humlebaek, Denmark.

DISTRIBUTIONAL DATA

Distributional information may be obtained from various sources: Floras and monographs, geobotanical, phytosociological and vegetation studies, herbarium labels, biodiversity databases, etc. Remember to be aware of synonyms for various species.

Various tools have been developed for the prediction of the geographic distribution of species. Many require the support of a **Geographical Information System (GIS)**. A GIS is a collection of hardware and software tools used to enter, store, modify and display spatial (geographically referenced) data from different sources. It is typically used for manipulating maps with linked databases which can be represented as several layers.

How many individuals, how many populations?

How many individuals and populations of a target species should be conserved to ensure their survival is subject to much debate. Various concepts for population and meta-population viability exist[3]:

- Population viability analysis (PVA) estimates the probability that a population of a specified size will persist for a specified length of time by analyzing the environmental and demographic factors affecting the survival of a population[4].
- The minimum viable population (MVP), introduced by Soulé (1986), is the smallest population size that will persist for a specified time period with a specified probability.
- The minimum amount of suitable habitat (MASH) is the number (normally 15–20) of well-connected patches needed for the long-term survival of a meta-population[5, 6].
- The minimum viable metapopulation size (MVM) is an estimate of the minimum number of interacting local populations necessary for long-term survival of a metapopulation[5].

3 - Heywood, V.H. and Dulloo, M.E. [2006 (2005)] '*In situ* Conservation of Wild Plant Species – a Critical Global Review of Good Practices,' IPGRI Technical Bulletin, no 11, FAO and IPGRI, International Plant Genetic Resources Institute (IPGRI), Rome, Italy.

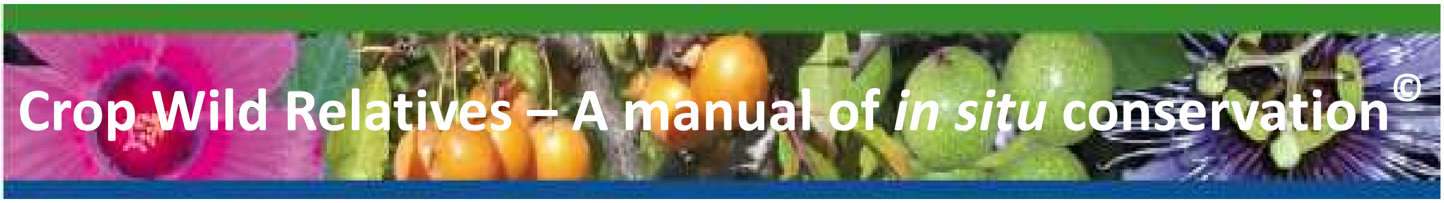
4 - Morris, W.F. and Doak, D.F. (2002) Quantitative Conservation Biology: Theory and practice of population viability analysis, Sinauer Associates, Sunderland, MA, USA.

5 - Hanski , I., Moilanen, A. and Gyllenberg, M. (1996) 'Minimum viable meta-popualation size, American Naturalist, vol 147, pp 527–541.

6 - Hanski, I. (1999) *Metapopulation Ecology*, Oxford University Press, Oxford.

Georeferencing

The process of converting text descriptions of locations to those which can be ready by a computer (through GIS software). **The BioGeomancer Project** (http://www.biogeomancer.org/understanding.html) provides tools to improve georeferencing results.



ECOLOGIC INFORMATION

Determining the ecological conditions under which CWR grow is critical. Common criteria for collecting ecological information through field surveys are:

- Habitat types
- Condition of the habitat
- Disturbance regimes
- Threats to the habitat
- Topography
- Altitudinal range
- Soil types
- Slope and aspect
- Land use and /or agricultural practice

Methodologies for field surveys

At each site, latitude, longitude and altitude should determined by GPS, and location descriptors (geographical region, road or settlement name, proximity to prominent land marks) and physical site characteristics (habitat type, slope, aspect, and precise location of target species plants at the site, if found) should be recorded.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Data analysis and products

Data gathered may be analyzed using Discriminant Analysis or Principal Component Analysis. For the visualisation, analysis and management of spatial data, GIS-based packages such as ArcInfo, WorldMap or DIVA may be used.

One of the main products of an ecogeographic survey is the **ecogeographic conspectus** – a formal summary of the available taxonomic, geographic and ecological information of the target taxon, gathered from the herbarium and field surveys (Maxted et al. 1995). It includes the accepted taxon name, authors, dates of publication, synonyms, morphological description, distribution, phenology, altitude, ecology and conservation notes

FURTHER INFORMATION

The Bioversity International series 'Systematic and Ecogeographic Studies on Crop Genepools' covers some of the most important CWR and are available for download at: http://www.bioversityinternational.org/scientific_information/themes/germplasm_collection.html#c448.

The Crop Genebank Knowledge Base has a training module for ecogeographic surveys: http://cropgenebank.sgrp.cgiar.org/index.php?option=com_content&view=article&id=378&Itemid=538.

Bioversity International's training modules for ecogeographical surveys.

http://209.85.229.132/search?q=cache:bwNRiRW-q3AJ:www.bioversityinternational.org/scientific_information/information_sources/training_modules/eco-geographic_surveys.html+ecogeographic+surveys&cd=1&hl=en&ct=clnk&gl=uk