FAIRWILD RISK ANALYSIS METHODOLOGY FOR PLANTS

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1. BACKGROUND: THE CONCEPT OF RESILIENCE

Assessment of the conservation status of species using the IUCN Red List Categories and Criteria is time-consuming and costly. A Red List of threatened medicinal and aromatic plants (MAPs) does not (yet) exist. The scarcity of financial resources in this field has led to a situation that IUCN threat assessments have so far been carried out for relatively few medicinal plant species (just 19% of the world's well-documented medicinal flora has been evaluated for global conservation status at the time of writing[1]). Our knowledge of which species are declining in their populations due to over-collection is still rudimentary.

A first step to overcome this knowledge gap is to assess MAPs regarding their resilience to collection. Species respond differently to the same collection pressure. **Resilience** is the overall potential of the target species to be managed on a sustained-yield basis.

Susceptibility to over-collection is **species-specific**. It can be determined largely on the basis of functional biological attributes such as distribution, regeneration or reproduction; attributes which determine how resilient a given species is against collection pressure. For example, an endemic species is more susceptible to over-collection than a globally distributed one, a slow-growing species more susceptible than a fast-growing one. Resilience can therefore be predicted by a small, well-chosen set of ecological, threat, and trade attributes or factors. Currently, nine factors are used in the risk analysis matrix employed by FairWild:

- Conservation status
- Threat causes
- Scale and trend of use and trade
- Plant part collected
- Geographic distribution
- Typical population size
- Habitat specificity
- Regeneration
- Reproduction

These factors were selected to provide a balance between number of factors considered and the confidence level of the risk analysis, while avoiding making the process overly time consuming. The methodology used is designed to allow a risk analysis to be carried out within the equivalent of one working day for the majority of species.

1.1. Role in FairWild certification

The FairWild Standard version 2.0 makes a distinction between species considered to be at High Risk of unsustainable wild collection and species considered to be at Medium or Low Risk of unsustainable wild collection. More information on the classification system is given on pages 2-4 of the FairWild Standard Performance Indicators[2].

FairWild certification of collection operations involving High Risk species must meet an additional set of indicators that require more rigorous approaches to resource assessment, monitoring, and management. It is therefore necessary to determine the level of risk for all species involved in collection operations currently certified as FairWild compliant, as well as all species involved in collection operations applying for FairWild certification.

[1] IUCN Medicinal Plant Specialist Group in Timoshyna et al. (2020). The Invisible Trade: Wild plants and you in the times of COVID-19 and the essential journey towards sustainability. TRAFFIC International, Cambridge, United Kingdom

[2] FairWild Foundation (2010). *FairWild Standard: Version 2.0 / Performance Indicators*. FairWild Foundation, Switzerland.

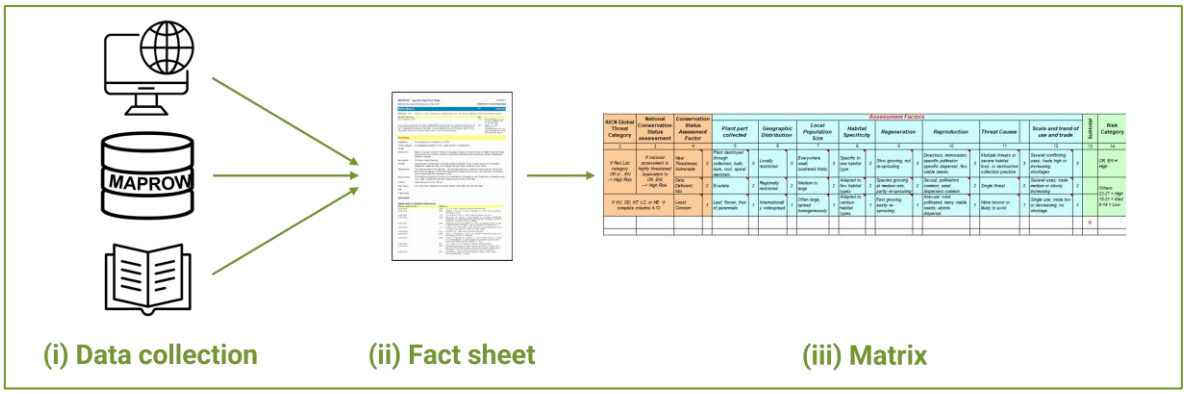
2. APPLYING THE RISK ANALYSIS METHODOLOGY

The risk analysis has three main steps (**Figure 1**):

(i) collection of data on the target species;
(ii) aggregation of these data in a fact sheet including summaries; and
(iii) completion of the matrix.

Steps (i) and (ii) are an objective representation of the available data sources; step (iii) is the interpretation and evaluation by the reviewer.

Figure 1: Workflow for FairWild Risk Analysis



3. DATA BASIS: THE FACT SHEET

Information required to undertake risk/resilience analyses is drawn from a wide range of published and unpublished sources, including individual expert knowledge, trade and industry networks, and global open-access resources such as the IUCN Red List. The data collected for any new application are merged in a standardised fact sheet. This underpins the key concept that the sources for risk analyses can be retrieved and revisited at a later stage.

4. METHODOLOGY: THE MATRIX

The factors assessed during the risk analysis for plants are presented in **Table 1**. These were selected as those which can be used to inform resilience and also which are likely to have information available in the scientific community.

During the process of conducting a risk analysis, each factor is assessed as Low, Medium or High Risk, and assigned the corresponding score: Low Risk = 1, Medium Risk = 2; and High Risk = 3. **Table 2** shows the three scoring levels for each factor and the indicators for each risk level as they are currently defined.

The scores of all individual factors are then combined to give an overall score between 9 (minimum) and 27 (maximum). This score is then used to assign an overall risk rating, as follows: 9-14 = Low Risk; 15-21 = Medium Risk; and 22-27 = High Risk. The quantitative nature of the analysis enables comparison of relative risk of over-collection between different combinations of species/part collected/country of collection, and tracking of changes in assignment of collection risk over time as more information becomes available or factors change (e.g. scale and trend of use and trade).

Resilience of a species to wild collection may be different for different collection operations. Resilience is dependent on the plant part gathered (factor "Plant part collected"). The factor "Conservation Status Assessment" takes into account the species' conservation status over its entire range, as well as in the country of collection. The factors "Typical population size" and "Habitat specificity" may differ between countries and regions. Therefore, if a species has been evaluated for one country and a new application targets another country, a new analysis must be carried out, including both data collection and matrix completion.

4.1. Use of existing Red Lists

The first factor of the matrix evaluates the “Conservation Status Assessment” and takes into account existing Red List information. During the development of the matrix it was decided that a species which is globally or nationally (in the country of collection) assessed as Critically Endangered (CR) or Endangered (EN) according to or equivalent to the IUCN Red List Categories and Criteria would be automatically assigned as High Risk in terms of resilience. The other factors of the matrix are in these cases irrelevant. For species evaluated as Vulnerable (VU), Near Threatened (NT), Data Deficient (DD) and Least Concern (LC) or those with no conservation status assessment, one of the level states 1-3 is assigned and the other factors of the matrix have to be evaluated.

4.2. Addressing lack of data

In principle, even wild plant species with little information in scientific literature can be accepted into the FairWild system. In the case where data on a factor are unavailable, the precautionary principle will be used and the factor scored as "2" indicating that it is "unknown" in the respective cell of the matrix.

However, with an increasing number of factors without available information, there becomes less information upon which to base the risk analysis score. Again using the precautionary principle, the matrix will therefore be completed differently depending on the number of unknown factors:

- **One or two factors are unknown**: these factors are scored as 2, unless another scoring is justified using inferred information from another related species.
- **Three to four factors are unknown**: as above, unless the harvest is destructive to the individual plants (Plant part collected = 3). In this case, the harvest is automatically classified as High Risk.
- **Five to seven factors are unknown**: The harvest is automatically classified as High Risk

It should not be possible for more than seven factors to be unknown, as the Conservation Status Assessment Factor and Plant Part Collected will always be known.

4.3. History of the matrix

The concept of resilience to unsustainable wild collection and the development of a matrix of factors proposed as the basis for analyzing the level of wild collection risk or resilience represents the current end point in a process of discussion, presentation, and publication of ideas that involves individuals, organizations, and processes both within and beyond the development of the FairWild Standard. Major early stepping stones were the contributions by Peters (1994)[3] and Cunningham (2001)[4] who have defined a broad set of ecological attributes which define resilience. Both sources have been taken as a basis in designing the present risk analysis matrix developed by the Medicinal Plant Specialist Group of the Species Survival Commission, International Union for Conservation of Nature (IUCN). The resulting matrix is used in the FairWild certification process.

[3] PETERS (1994): *Sustainable harvest of non-timber forest plant resources in tropical moist forest. An ecological primer*. - WWF Biodiversity Support Program, Washington, D.C.

[4] CUNNINGHAM, A.B. (2001). *Applied ethnobotany: People, wild plant use and conservation*. Earthscan, London (People and Plants Conservation Manuals).

Table 1: Factors of Resilience

Factor	Definition
Conservation Status Assessment	This factor evaluates the known conservation status of populations of the target species. In case national and/or global threat assessments have rated the species as Critically Endangered (CR) or Endangered (EN) according to or equivalent to the IUCN Red List Categories and Criteria (version 3.1), the species is automatically assigned to the High Risk category. For species evaluated as Vulnerable (VU), Near Threatened (NT), Data Deficient (DD) and Least Concern (LC) or those with no conservation status evaluation, one of the level states 1-3 is assigned.
Threat Causes	This factor assesses whether the known causes of threat to the target species -if any- are single or multiple. Threat causes other than collection include habitat loss, degradation or land use changes, impact of invasive alien species.
Scale and trend of use and trade	This factor assesses the level of trade (volumes if available; otherwise, a qualitative assessment), its diversity (only single use or multiple uses) and its current and future trend. It also takes into account whether trade is on a local, national, or international scale.
Plant part collected	The resilience of the target species is dependent on the plant part which is collected in relation to the ability of the individual plant and the harvested population to recover. E.g. collection of leaves from a tree species is regarded as having low risk of killing the tree or decreasing the population over time, while collection of roots from an herb species rates as High Risk because each plant collected may be destroyed by the collection. For the evaluation of this factor, the life form of the species (annual, biennial, perennial, geophyte, shrub, and tree) has to be taken into account. In case branches would be cut to harvest leaves, this destructive harvest practice must be handled under “Threat causes” (Factor 11).
Geographic Distribution	This factor assesses the known global range of the species.
Typical population size	This factor assesses the spatial distribution across the range of the species. It measures whether populations are large, abundant and homogeneous or small, clumped and scattered. This factor may be assessed differently depending on the country of collection because many species are distributed across national political boundaries and may be more abundant in the centre of their natural range and less abundant at the periphery.
Habitat Specificity	This factor assesses habitat preference of the target species. It looks at the number of habitats occupied and also at the possible threat to these habitats. This factor may be assessed differently depending on the country of collection.
Regeneration	This factor assesses the capacity of the individual plant (or the population, in the case of annuals or lethal harvest) to regenerate the material collected after harvest. Aspects of this are the general growth rate and especially the (re-)sprouting capability (rhizomes, creepers, clonal growth) of perennials.
Reproduction	This factor evaluates the relative reproductive specialization of the target species, where asexual reproduction, abiotic pollination and seed dispersal, and abundant pollinators and seed dispersers are less specialized than sexual reproduction, biotic pollination and seed dispersal, and abundant pollinators and seed dispersers. A reduction in availability of individuals or reproductive parts (flowers, seeds) will have a greater impact with greater specialization.

Table 2: Factors and definition of risk levels of matrix version 2.4

Risk Level	Score	Definition
Conservation Status Assessment		
Low Risk	1	Conservation status assessed as "Least Concern" (LC); populations not declining (stable or increasing)
Medium Risk	2	Conservation status assessed as "Data Deficient" (DD) or threat category for the species has not (yet) been assigned; populations not known to be declining
High Risk	3	Conservation status assessed as "Near Threatened" (NT) or "Vulnerable" (VU); populations declining
Threat Causes		
Low Risk	1	No threats to the species are known or likely to exist
Medium Risk	2	Species faces single threat cause
High Risk	3	Species either faces multiple threat causes or severe habitat loss; or destructive collection practices are used
Scale and trend of use and trade		
Low Risk	1	Used in one field; trade level low or even decreasing; no shortage of material observed
Medium Risk	2	Several non-conflicting uses; trade level medium or slowly increasing
High Risk	3	Multiple, conflicting uses; trade level high; demand increasing; shortages of material in trade
Plant part collected		
Low Risk	1	Collection of leaves, flowers or fruits of trees, shrubs or perennial plants
Medium Risk	2	Exudates (sap, resin)
High Risk	3	Collection of whole plants; collection of annual plants; collection of bulbs, bark or roots; apical meristem of monocarpic species
Geographic Distribution		
Low Risk	1	Distribution is internationally widespread, species occurs on >1 continent
Medium Risk	2	Distribution is regionally restricted, often to one continent
High Risk	3	Distribution is locally restricted, i.e. to several or few countries or even endemic to one country
Typical Population Size		
Low Risk	1	Populations often large and spread homogeneously across the landscape
Medium Risk	2	Populations mostly medium-sized, sometimes large, often clumped
High Risk	3	Populations everywhere small; scattered thinly across the landscape
Habitat Specificity		
Low Risk	1	Species is highly adaptable to various habitat types; habitat stable
Medium Risk	2	Species is adapted to few habitat types or many, but threatened habitat types
High Risk	3	Species is narrowly specific to one habitat type or few, but threatened habitat types
Regeneration		
Low Risk	1	Species is fast growing and/or easily re-sprouting after collection
Medium Risk	2	Growth rate medium and partly re-sprouting after collection
High Risk	3	Species is slow growing and/or not re-sprouting
Reproduction		
Low Risk	1	Species reproduces asexually or is wind pollinated; many viable seeds with abiotic dispersal
Medium Risk	2	Species reproduces mainly sexually and has common pollinators; seed dispersal biotic with common dispersers
High Risk	3	Species is dioecious or has monocarpic apical meristem; adapted to specialised pollinators and/or seed dispersers; produces only few viable seeds.