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EAFRINET and the Taxonomic Impediment: perspectives from the developing world (Kinuthia *et al.*)

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Taxonomic capacity in the developing world is seriously lacking, and as such species identification for both pests and useful species is seriously hampered. Some of these species are key indicators of environmental health and climatic changes, and as such call for continuous and informed monitoring. From the developing world point of view, several useful indicators can be listed for lifecycle assessment. However, such would be limited to taxa that have experts and have been researched on and documented in the region. Such indicators as spiders (Araneae), terrestrial molluscs (Mollusca), bees (Apidae) and beetles (Coleoptera) and their value as indicators are discussed. Measurements of environmental damage and resultant loss of biodiversity, both at the species level (micro) and at the landscape level (macro) as a key baseline for decision making in environmental planning and management form part of the taxonomic mandate. One component of the life cycle assessment, beyond the biodiversity and ecosystem health analysis, therefore must address landscape level impacts. From a developing world perspective, this must involve evolving a toolkit for assessing the economic values of biodiversity and land use impact, including human health and food security. Species stock-dynamics, such as availability, ranking and user-preferences, and human/scientific perspectives should form a critical part of the assessment, and within the taxonomic networks this is measured by availability and subsequent access to information and data that is useful and relevant in both space and time. Intra-institutional issues that may contribute to this impediments, and which can be transformed into opportunities to supplement and indeed, bulwark the assessment will be addressed in this paper.

Why are arthropod species good biodiversity indicators (Spiders, mollusks, bees beetles)?

Arthropods are considered key biodiversity indicators since they are a mega-diverse group for which knowledge is sufficiently advanced to allow most taxa (and in case of spiders) an all-taxa inventory. Arthropods inhabit a big range of microhabitats ranging from the ground/soil, through to herb layer to the tree canopy as well as man-made structures. Spiders are fairly easy to identify at least to genus level using external morphological features, well-simplified characters in the shape of genitalia. This is even made easier by the on-line availability of a world spider catalogue (Platnick 2002) that makes identification and verification relatively easy. Bearing in mind the choice of a particular indicator species, evaluation of the state of biodiversity and any conservation evaluation would depend on the precise goals, the scale of the assessment and availability of material and human resources. The arthropods qualify as important bio-indicators because their abundance, short and overlapping lifecycles are easy to collect with cheap and hence cost-effective methods of sampling. Therefore, any decline in numbers and or morphological defects resulting form pollutants (especially for water dwelling organisms) are manifested within a relatively short time. A good example is spiders, which adapt to particular structure of the habitat and small-scale changes can have vast effect in community diversity, species richness and abundance of individual species. Already a study by (Warui 2005, Warui et al. 2005) demonstrated the effect by different types of land use including grazing on the composition of the spider fauna in east African savannas. This is true to most invertebrate taxa though studies on bees are just begging in sub-Saharan Africa through efforts of the African Pollinators Initiative (Martins, D. J. *et.al* 2003 & Gemmill, B. *et.al* 2004) and the BioNET-International African- networks.

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The interaction and inter-linkages amongst arthropods as predator-prey, parasite-host, parasitoid-host and between species as food in the food chain, vectors and pests as well as role in soil structure modifiers places these important organisms that humankind consider as a nuisance a unique source as an indicator of environmental change. The key role of ecosystem service as is the case of pollinating species cannot be overemphasized. Finally, arthropod biodiversity is interesting in its own right, and worthy of protection and research.

Summary

Spiders are a diverse taxon that forms an important component of most terrestrial ecosystems. They are abundant in nature, easy to collect, found on many types of habitats and reproduce quickly several studies have used them for bio monitoring as reviewed in Churchill (1997). Other important features of spiders include webs as indicators of environmental chemistry (Hose *et al.* 2002), and growth pattern (Vollrath 1988) body size (Warui and Bonte in prep) as indicators of habitat quality. Spiders play a role in regulation of insect and other invertebrate populations (Riechert 1974, Wise 1993; Russell-Smith 1999).

Measurement of biodiversity and food security

To protect biodiversity, one must be able to measure and quantify it. This is best done using indicator species. To determine which elements of biodiversity are present in the area of interest (e.g. genes, species, and ecosystems), ideally one would want a complete/comprehensive inventory of all elements, which is virtually impossible. It is more practical to carry out an inventory of species in the area. There are two alternatives towards accomplishing this: Rapid assessment of a few groups by experts e.g. invertebrates (spiders, bees, butterflies, beetles), birds, plants and mammals etc.; and to carry out a comprehensive collecting and shipment to experts wherever they are.

Measurement of spatial distribution can determine species endemism and extirpation on a local scale. The scale of distribution for a species will influence the vulnerability of a species to environmental changes, therefore extinction, whether in real terms or on the basis of threats. The risks of extinction at different spatial scales are a key consideration when deciding which endangered species are high priorities. It shows that while the immediate causes of biodiversity loss lie in habitat destruction and harvesting, the underlying causes are incentives that encourage resource users to ignore the effects of their actions. These effects include both loss of genetic material, and the collapse of ecosystem resilience, our "insurance" against the fundamental uncertain effects of economic and population growth. The "solutions" are argued to lie in the ***reform of incentives.***

Loss of habitat leads to loss of biodiversity. Such biodiversity include pollinators such as bees and flies. As such the loss of biodiversity can also affect food security in that these groups are pollinators and their decline can reduces chances of cross pollination hence affecting food security.

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