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[Keynote] Conservation of Terrestrial Biodiversity in French Polynesia: Needs and Priorities for Research and Management

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S2-A Keynote

Conservation of Terrestrial Biodiversity in French Polynesia: Needs and Priorities for Research and Management

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The world is facing an unprecedented loss of biodiversity caused by direct or indirect human impacts (called the “sixth mass extinction” by R. Leakey and R. Lewin in 1995). This phenomenon is exacerbated on small oceanic islands, such as those of French Polynesia (South Pacific Ocean), where a unique terrestrial endemic fauna and flora has evolved during millions of years in complete isolation from anthropogenic disturbances. French Polynesia belongs to the “Polynesia-Micronesia” biodiversity hotspot, possessing four “Endemic Bird Areas” (according to BirdLife International) and one “Plant Diversity Centre” located in the Marquesas (IUCN/WWF). According to the IUCN Red Lists of threatened species, French Polynesia has the second highest number of extinct species worldwide (ca. 80 documented species), and more than 50 other species are on the brink of extinction. One of the major threats for terrestrial biodiversity, along with habitat destruction and overexploitation (e.g. sandalwood), is the invasion by alien plants or animals. Several spectacular and ecologically disastrous examples are well-documented in French Polynesia (rats, carnivorous snails, miconia tree, predatory or aggressive birds, insects such as fruit flies, sand flies, ants), which can now sadly be called a “paradise for invasive species”. Globalization and the rapid increase in transportation of people, goods and materials with the neighbour continents and islands in the Pacific region is leading to more species introductions, thus enhancing the risk for further invasions (e.g. little fire ant, snakes, frogs, cicadelids...). The fast population growth rate in French Polynesia (doubled in the last 35 years), with 70% of the inhabitants living in the island of Tahiti, is leading to strong human pressures on natural resources and increasing disturbance in native habitats (deforestation, fires, pollution...)

The aim of this presentation is to stress the importance and urgency of conducting more research in the field of conservation biology in French Polynesia. The main goals of this relatively new but integrated science (called the “Science of Scarcity and Diversity” by M. E. Soulé in 1986) are to document the full range of biodiversity (from genes to ecosystems); to investigate past and current human impacts (including biological invasion); to develop

practical approaches to prevent species extinction as well as habitat alteration, fragmentation and destruction; and eventually to promote sustainable development. French Polynesia can be seen as a natural laboratory or a “model system” (as defined by P. Vitousek in 2002) consisting of about 120 small tropical islands of the same volcanic origin but with different geological age, size, topography and soil substrate (atolls, raised atolls, composite islands, high volcanic islands, rocky islets) and even climate (tropical to subtropical), scattered across an area the size of Europe. These island “replicates” can be used to design relevant and unique studies (different from those conducted in the large and isolated islands of Hawaii or the Galapagos) on biogeography (e.g. island colonization), evolution (e.g. speciation, niche adaptation), population dynamics and genetics (e.g. species rarity, succession, gene flow) and above all conservation (e.g. fragmentation effects, habitat restoration, species translocation, *ex situ* conservation, invasive species control, natural resources management, and protected areas).

Research priority in French Polynesia should be given to more species inventories (especially the lesser known taxa such as arthropods, fungi, lichens and others), their conservation status and geographic location, but should also focus on habitat classification and location (e.g. using satellites photos, GIS maps). Studies of ecosystem structure and functioning should be developed or initiated, especially the role of watersheds and wetlands, and the causes and impacts of soil erosion (including landslides). There is a need for more paleo-biological studies to document the past role of human occupation (Polynesian *versus* European periods), as well as studies to define accurate bio-indicators for monitoring biodiversity evolution and global climatic change on a long-term period. Management priorities include the development of integrated control methods for invasive species and scientific monitoring protocols.

Social and cultural aspects should be integrated into research or management programs when possible because of the diversity and complexity of traditional Polynesian knowledge (e.g. management of natural resources, uses of medicinal plants, selection of food crops cultivars), which could be called “ethnobiodiversity” (*sensu* R. Thaman). One of the main limiting factor for conservation biology, for example to achieve the “2010 Countdown” international goal to halt the loss of biodiversity, is the small number of local trained biologists and committed conservationists. Thus education, training and capacity building should be considered one of the highest priority in French Polynesia.