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Tropical biodiversity: surviving the food,energy and climate crisis

Patnerships

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Biodiversity informatics for biological conservation and management: CBD meets RDF (#04)

(July 23 pm; Garuda)

Organized by: **Teguh Triono and Campbell Webb**

Recent years have seen an explosion in technological capabilities for organizing and cross-linking biodiversity information. At the same time, the loss of natural habitats continues rapidly in megadiversity countries, and the conservation needs for biodiversity data are greater than ever. Many developing countries are struggling to meet the taxonomic reporting requirements for the Convention on Biological Diversity deadlines for 2010. At this key time (also the International Year of Biodiversity), we want to bring some leading developers of biodiversity informatics together in a symposium at a conference focused on tropical biodiversity, to expose some of these new technologies and to demonstrate their real-world applications in conservation and management. We hope to bring the energy and content of exciting recent meetings like eBiosphere and TDWG 2009 to a wider audience of tropical field biologists, because it is upon the latter that the future of biodiversity data collection in megadiversity areas depends.

V-04-1: Biodiversity Knowledge from Existing Biodiversity Data

A. Townsend Peterson[1]; *Biodiversity Institute, University of Kansas*

The biodiversity crisis is one of accelerating biodiversity losses in the face of broadening human impacts on global landscapes. Clearly, facing this crisis places a premium on effective and informed decision-making, which in turn requires solid information about biodiversity patterns and processes. Unfortunately, time for such steps is limited, meaning that effective use of existing information is crucial. I here review ideas and strategies for deriving useful information products from existing biodiversity data by means of a suite of explorations, visualizations, and analyses, and taking care to avoid overinterpretation of results. Existing biodiversity inventories can be quality-controlled and assessed for completeness; geographic distributions of species can be estimated, and gaps in knowledge identified; likely effects of land use change and climate change can be forecast, and patterns of biodiversity change and loss estimated. This immediately-feasible step is important, as it allows marshalling of existing knowledge to answer immediate questions; it does, however, place a premium on digitization and integration and sharing of existing biodiversity data on a global scale.

V-04-2: The Biodiversity Information System Needs for Network of Ecological Plots in Tropics

Motomi Ito[1], Noriaki Sakaguchi[2]; *1. Univ. Tokyo, Japan, 2. Biodiversity Center, MoE, Japan*

We have many observation plots of forest ecology in South East area. However, it cannot say that we share information among the observation projects. Thus, we need an information system for sharing and integrating the information of them. AP-BON, a biodiversity observation network in Asia and Pacific areas had been established in connection with GEO-BON, and we are now constructing basic information system for it. Here, I would introduce the information system for forest ecology observation plots, and its utility for promoting more effective observation.

V-04-3: Challenges and Solutions for Planning and Implementing Large-scale Biotic Inventories.

Maurice H. Leponce[1], Yves Basset[2], Christopher Meyer[1], Christoph Häuser [1], Philippe Bouchet, Jacques Delabie & Lee Weigt; *1. Royal Belgian Institute of Natural Sciences, 2. Smithsonian Tropical Research Institute*

2010 was declared the international year of biodiversity. Yet there is still no complete or near complete information on the total biodiversity of any species-rich ecosystem around the world, even in protected areas. Large-scale inventories can maximize the biodiversity information collected through the coordinated effort of a multidisciplinary team. They produce an overall picture of highly complex ecosystems and may be instrumental for conservation and management decisions. Based on our experience with the IBISCA and Moorea Biocode projects and on a review of the literature related to All Taxa Biodiversity Inventories, we identified four kind of challenges that comprehensive biodiversity inventories basically face. First, biological challenges, as species distributions are heterogeneous in space and time. Representative results may thus only be achieved with adequate spatio-temporal replicates. Second methodological challenges, since any sampling method provides a biased image of species composition and abundance. The use of complementary collecting methods helps to circumvent this problem. Third, taxonomical challenges, as large inventories generate an impressive amount of material to process and identify. To avoid work overload of expert taxonomists the material should be pre-processed by assistants (students, amateurs, parataxonomists, volunteers) supervised by professionals. Fourth, planning and implementation challenges, since security and legal issues, coordination of collection and processing of material, centralization of data, and follow-up of the project may not be straightfoward. An ideal implementation requires an organizational structure composed of coordinators, advisors, workgroups and external partners. Comprehensive inventories typically span over several years. To keep the motivation of participants and of stakeholders the project output should include fast deliverables in addition to long-term research.

V-04-4: Integrating and Sharing Biodiversity Data Online

Jeremy Miller[1], Charles Griswold[2], Pham Dinh Sac[1]; *1. Department of Terrestrial Zoology, Nationaal Natuurhistorisch Museum Naturalis, 2. Department of Entomology, California Academy of Sciences*

Within the past few years, advances in technology and cyberinfrastructure have finally given us the tools to realize the full potential of taxonomy: an integrated consortium of resources for organizing, interconnecting, and recombining fundamental information about the world's biodiversity for multiple user groups. Publications in taxonomy stereotypically contain a limited number of data classes. Community resources are now available for curating these data online, including Zoobank for nomenclature, Morphbank for images, GBIF for specimen data, and Encyclopedia of Life for descriptions and synthesis. If taxonomists continue to produce the data products they always have but also make those data available through online resources, the cumulative contribution of taxonomic research will become much more accessible and useful to scientists, decision makers, and the other information consumers. Images and data from inventories posted online can likewise increase the relevance and impact of collecting expeditions. We highlight examples from recent taxonomic publications and collecting expeditions.

V-04-5: Borneo’s Remaining Forests

Niels Raes[1], J.W. Ferry Slik[2], E. Emiel van Loon[1], Hans ter Steege[1], Marco C. Roos, Pieter Baas; *1. Leiden University, 2. Xishuangbanna Tropical Botanical Garden*

Although it is widely recognized that Borneo harbours one of the world’s most important biodiversity hotspots, the spatial patterns of botanical richness, endemicity, the ‘centres of endemicity’, and Borneo’s floristic regions, have largely been based on informal expert opinion until now. Recent digitization of the botanical collections of Borneo, housed at the National Herbarium of the Netherlands, has provided us with a database that allowed a quantitative, spatial analysis of the components of botanical diversity of Borneo.

Human activities in the forest of Sulawesi region have long been a part of forest dynamic history in the region. Experiencing the most alarming rate of deforestation compare to other islands in Indonesia, only a few studies were carried out in addressing the effect of disturbance to avian community. Evaluation on the effect of disturbance was mostly discussed in a land-use context and was less in an anthropogenic disturbance context where illegal logging and poaching were included. Lambusango forest in the Central of Buton Island, Southeast Sulawesi was the subject of three year monitoring program to detect the response of the forest structure to anthropogenic disturbance in which we monitored it through avian community. Surveys were carried out at six study sites within Lambusango forest, comprising vegetation survey and bird monitoring using Point Count Distance Sampling. Point count distance sampling was used to survey the birds. At each site, four transects were laid at 1-km apart where points were located along the transects at 150-m apart. Vegetation data were also collected at each of the point. Two disturbance levels characterized the Lambusango forest – lightly disturbed forest and more heavily disturbed forest and this affected the birds at community, population, and species level. Short-term monitoring did not detect significant changes in diversity and abundance which may be related to the low levels of disturbance. Although bird diversity was relatively similar, the community composition was affected. The lightly disturbed forest supported higher frugivore populations suggested the higher habitat quality and thus indicated that disturbance increased vulnerability of frugivore population.

New Guinea biodiversity and ecosystems (#53)

(July 21 am; Wantilan wing)

Organized by: **Charlie D. Heatubun and Campbell O. Webb**

V-53-1: Plant - Insect Food Webs in Tropical Forests: a Papua New Guinean (ad)venture

Vojtech Novotny; *Ecology and Conservation Biology, Institute of Entomology, Czech Academy of Sciences*

The study of tropical rainforests is slowly moving from the inventory of species, which was on the cutting edge of research in the 19th century, through the inventory of trophic relationships modern in the 20th century to modern analysis and experiment. Recent advances in the analysis of complex food webs, together with the introduction of phylogenetic perspectives into the study of tropical communities, the proliferation of large-scale field censuses of rainforest composition, and first community-scale manipulative experiments set the scene for an interesting and promising future of ecological research in tropical rainforests. All this will be illustrated using our long-term research of rainforest ecology in Papua New Guinea.

V-53-2: Diversity and Distributional Patterns of New Guinea Termites

Yves Roisin, Thomas Bourguignon, Jacques M. Pasteels, Maurice Leponce; *Université Libre de Bruxelles*

Insects are often better than vertebrates at crossing water gaps and ignoring Wallace's line, but the dispersal of termites is hindered by constraints on colony foundation. Small-colony drywood termites (Kalotermitidae) easily colonize islands from drift wood, but overseas dispersal of large-colony ground-dwelling Termitidae is more difficult. Termite distribution is also limited by mountain ranges. In addition, New Guinea presents contrasting lowland ecosystems, between equatorial rainforests surrounding the central and northern ranges and Australian savannas in the southern plains. Extensive termite collecting in New Guinea between 1978 and 1995 allowed us to carry out detailed taxonomic work and assemble a large array of distributional data. We identified 80 species representing 24 genera in 3 families: Kalotermitidae (5 genera, 20 species), Rhinotermitidae (6 genera, 15 species), and Termitidae (Termitinae: 7 genera, 23 species; Nasutitermitinae: 6 genera, 22 species). Rare, remarkable findings include Termitogeton planus, formerly unknown east of Borneo, and Calcaritermes krishnai, only known from the Nicobar Islands. One species, the neotropical Nasutitermes corniger, appears as a widespread, well-established invader. Most New Guinean species are wood feeders, while some feed on grass or lichens. Only the 10 species of the Termes-Pericapritermes group show some degree of specialisation towards soil feeding. As predicted, most termite species occurring in the southern savannas also occur in northern Australia. By contrast, many New Guinean forest termites are endemic or shared with nearby islands to the east. The forest fauna shows limited differentiation between northern and southern sides of the central ranges and some east-west discontinuities. This is consistent with a colonization from Sundaland followed by local speciation.

V-53-3: Recovery or Degradation? Dynamics of Natural Tropical Forest After Selective Timber Harvesting in Papua New Guinea

Cossey K. Yosi, Julian C. Fox, Rodney J. Keenan; *The University of Melbourne*

The dynamics of forest after timber harvesting is a major issue for tropical forest managers and communities. Timber harvesting has also been identified as a potential contributor to deforestation and degradation of tropical forests. In Papua New Guinea (PNG), selectively-harvested forests amount to 10% of forested areas. The objectives of this study were to analyse trends in basal area (BA) from impacts of selective timber harvesting; precipitation; forest fires caused by the1997-1998 El Nino drought; and assess harvesting impacts on species diversity using data from permanent sample plots (PSPs) in the natural tropical forests of PNG. We tested two hypothesis: that a critical threshold BA may exist that determines if a harvested forest degrades or recovers; and that the mean basal area increment (MBAI) for plots measured <10 years and >10 years since harvesting is equal. Analysis suggested that a single critical threshold BA does not exist, rather, the response to harvesting is variable, with the majority of PSPs (76%) showing an increase in BA and remainder a decrease. There was no significant difference in MBAI between plots measured <10 years and >10 years since harvesting (P0.94>0.05). Average annual increment in BA across all plots was 0.18 m2 ha -1 y-1 while BA is affected by high mortality rates on plots severely burnt during the fire. Change in BA for plots on high rainfall sites was a positive trend while those on low rainfall sites indicated a constant trend. Thus, these forests show capacity to recover after selective timber harvesting, even when the residual basal area is low. The future fate of these forests will depend on the degree of future harvesting, potential conversion to agriculture and the impact of fire and other disturbances. Key words: Basal area, El Nino, mortality, permanent sample plot, precipitation, species diversity, Shannon-Wiener Index.

V-53-4: Ecology of Freshwater Snail Thiaridae Family (Mollusca: Gastropoda) in Papua

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Research of freshwater Thiaridae Family (Mollusca: Gastropoda) in Papua was conducted from October 2007 to August 2008 in Papua regions and West Papua (Main land and the surrounding islands). The Thiaridae specimens were collected from Sentani lake and 29 rivers. A quadrat transect method was used throughout the areas from 1 x 1 m2 metal frames which was systematically located every 20 m in 200 m line transects. Approximately, 10 species were catagorized as new record (need further study). The Shannon-Wiener Biodiversity Index ranged from the lowest 0,3 to the highest 1,16. The index showed trend increased in the northern part of island and decreased in the Southern part. Likewise, the density level also showed simillar pattern, which increased in the north and decreased in the south, ranged from 12,24 ind./m2 to 56.22 ind./m2. Furthermore, the distribution level of Thiaridae was influenced by the distance. The similar species increased in the nearest location and on the contrary, the similar species decreased in the distance location (R2 = 0.3862). Therefore,