SL201

Paleoecological Studies for Effective Ecosystem Management in Wetlands

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Wetland ecosystems are transitional zone between terrestrial and aquatic ecosystems and are valuable as sources, sinks and transformers of a multitude of chemical and biological materials. However, most wetlands in Korea have been destroyed or changed their roles by drainage and filling with soil for agriculture, residential and factory area and by pollutant input. It is time to manage wetlands in Korea efficiently before we loose any more.

To manage wetland efficiently, it is necessary to understand the cause-response relationship of watershed and wetland ecosystem changes. It is important to know the historical record of watershed and wetland change for this relationship. However, monitoring data are scarce for many ecosystems and if they are available, it is only for a few decades. Records in sediments, combined with human activity history, comprise retrospective studies on human impacts on wetlands beyond the time scale of any existing monitoring program. Thus, paleoecology can be an important tool for effective ecosystem management.

Sediments are formed by the input-output balance of materials and record environmental changes as changes in pollen, nutrients, and pollutant concentrations. Analyses of pollen, diatom, organic and inorganic materials, heavy metals can show changes in vegetation, water quality, nutrient level, water sources, pollutants.

This presentation includes paleoecological data at marshes in three regions: polluted area (Clear Lake area, U.S.A), managed area (Lake Tahoe area, U.S.A), and pristine area (Belize). Cores were dated by the ^{210}Pb dating method and analyzed for pollen and physico-chemical characteristics. Pollen analysis recorded the effects of logging, increased recreation, and water level change as well as the introduction of exotic species. The physico-chemical characteristics of sediments recorded construction activity, water level change, and pollutant level. Paleoecological records preserved the history of human activities and natural processes that affect the structure and function of ecosystems. Paleoecology can and should be used to provide information on the five major ecosystem management steps: description, diagnosis, prediction, prescription, and implementation (Cullen 1990).

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Roles of Restoration Ecology as an Ecology for the Future and Responsibility of Ecologists

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Human being has extensively invaded, occupied, and used the natural environment as a consequence of the advance of civilization. Mankind has increasingly modified the environment for his own benefit. Such modification has not only caused the extinction of many other species but also, it has caused human being himself to confront to serious environmental problems. The recognition of this fact by human is expressing in the establishment and development of restoration ecology. This new study field is, in fact, an Eco-technology directed towards healing of damages to the environment. The goal is to reestablish processes and functions

in a damaged site, imitating the way of healing works that an integral natural system carries out. Ecological restoration uses different treatments and approaches according to extents of the existing damage and to the specific goal to be achieved. An ecological diagnosis is, therefore, required prior to restoration practice. The cost and efforts to achieve a proposed goal can be significantly reduced when a restoration plan is formulated upon the results of well-conducted ecological diagnosis. Under such perspectives, restoration ecology is a practical science, which aims to solve the problems of the real world based on the existing ecological principle. Furthermore, restoration ecology offers opportunities to test the ecological concepts and theories obtained by means of the former ecological studies. Human being exploited natural environment excessively for his comfort on one hand but damaged it inevitably on the other hand. Such intensive resource utilization and continuous environmental damaging will extend into future and ultimately jeopardize the survival of humankind if no prompt action is taken. In the present situation, we must not continue on such lives without any preparation. We have to cope with the environmental crises approaching near us pursuing the ecological restoration that reduce the unnecessary use, recruit the deficient part, and strengthen the weak portion in our environment. Restoration ecology could be recognized as the ecology for the future in such viewpoints.

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Molecular Phylogeny of Tribe Caucalideae (Carrot Tribe) and Its Related Plants

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Since the tribe Caucalideae was established for those species of Apiaceae (Umbelliferae) with spines, tubercles or bristly hairs on the primary and/or secondary ridges of the fruits, there has been considerable disagreement as to its proper circumscription, the relationships among its members, and the delimitation of certain genera. Although Heywood and Jury (Heywood, 1982) provided a checklist of Caucalideae, recognizing 21 genera and 68 species, no rigorously constructed estimate of phylogeny exists for these taxa. Phylogenetic relationships within Caucalideae were assessed using nucleotide sequence variation in the internal transcribed spacer (ITS) regions of 18S-26S nuclear ribosomal DNA, detailed restriction site mapping of the chloroplast genome, and morphological and anatomical characters. Evolutionary patterns of selected (i.e., cytological, palynological, phytochemical, and morphological) characters were interpreted by plotting their distribution on the ITS-based phylogeny, revealing that many of these characters are highly homoplastic. On the basis of these comparative data, the following results were obtained: (1) Phylogenies derived from three independent lines of evidence are largely congruent, suggesting that hybridization may not have been a factor in the evolution of this group; (2) There is little support for any existing system of classification for the tribe. *Aphanopleura*, *Psammogeton*, and *Kozlovia* are excluded from the tribe, whereas representatives from tribe Laserpitieae are included. The genus *Chaetosciadium* is best treated within *Torilis*; (3) Fruit primary appendage characters are more useful than those of secondary appendages for delimiting generic boundaries; (4) Tribe Caucalideae sensu lato is provisionally established and consists of subtribes Daucinae (*Daucus*,