



Definition of the Glacier Ecosystem or *Glaciosystem*

DRAFT FOR COMMENTS

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The proposal to introduce the term GLACIOSYSTEM (referring to the Glacier Ecosystem) aims to offer to society, to policy makers, and to the scientific community, an understandable conceptual framework, that is geologically broad and which integrates natural elements associated to glaciers and their surroundings, and which is useful from the point of view of public policy geared to protect glacier resources and their surroundings.

We believe it is imperative to broaden the existing commonly utilized terms and definitions of what are glaciers and periglacial environments (limited generally to frozen grounds or permafrost) since they lack a proper consideration for the ecosystems that are necessary for the protection of cryogenic resources. Different terms have been employed in the past, such as “cryospheric environments” or the “glacier continuum”, but these are each limited in their own scope to address the concerns raised from a public policy perspective.

The introduction of the term “glaciosystem” has as an ultimate objective, the creation of a practical theoretical framework to consider physical zones surrounding a glacier that should be taken into account in the natural (or artificial) creation, evolution and protection of glaciers, as well as to facilitate the identification of glacial areas and their adjacent elements that are sensitive to anthropogenic activity and other phenomena that place glaciers at risk.

This definition been shared with a significant number of glacier specialists in the Latin America region and has undergone several draft versions incorporating many of the comments received. The present version reflects the largest possible consensus amongst the actors that responded to the draft, through February 2012. We invite all interested parties to contribute their comments to improve this definition.

Please send comments to:

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Definition of the Glaciosystem (or the Glacier Ecosystem)

The GLACIOSYSTEM (or Glacier Ecosystem) is the glacier and its surrounding ecosystem that influences its constitution and composition, with respect to its water and ice accumulation and ablation, determining its biological process, its natural evolution during its periods of charge and discharge, and which if affected, could impact or cause the alteration of the glacier and/or impact the ecosystem in which it exists.

The glaciosystem (or glacier ecosystem) includes elements such as:

Solids: geological/rock formations surrounding the glacier, whose characteristics and orientation influence in the accumulation of snow, the valleys through which the glacier flows, walls, mountainsides, and the slope on which the glacier advances, rock debris and other natural materials in its vicinity or in its ice, the moraines formed and accumulated by its advancement, among others;

Biological: Flora and fauna and other biological organisms in its immediate surroundings, underneath, beneath and inside of its ice;

Water, Snow and Ice: Snow that accumulates in the glacier through precipitation, water that flows on the surface, inside and underneath the glacier, ice of the glacier with varying densities and in different stages of compacting, other glaciers that unite with the glacier from higher water and ice basins, other glaciers to which the glacier unites, frozen grounds (permafrost) in the periglacial environment, natural or artificial lakes (dams) formed and nourished (even if only partially) by the glacier, natural or artificial melt water at the foot of the glacier;

Air and Atmosphere: The air surrounding the glacier, the atmosphere in the zone of impact that can be affected by artificial changes in the topography that alter the natural wind patterns that contribute to the natural accumulation of water and snow on the glacier, by contamination of the air with particulates that are deposited on the glacier, and that contributes to the natural evolution and of the glacier.

The glaciosystem (or the glacier ecosystem) can extend to zones including:

- a) in all directions surrounding the glacier;
- b) snow and ice on the glacier and to the side of the glacier and water as well as water immediately below the glacier;
- c) to the side of and on the valleys through which the glacier flows;
- d) in the immediate proximity or at a significant distance to the glacier, depending on the specific case and on the relevance of an eventual impact in the ecosystem of the glacier;

Human populations (rural and urban), agriculture activity and industries that are located in the vicinity of the glacier and that can be directly affected by the changes of the mass of the glacier and on the accumulation and ablation of snow, might depend directly or indirectly on the glacier and glaciosystem.

The health of the glacier and its glaciosystem es evaluated by measuring and monitoring the evolution of the following variables:

Accumulation and Ablation
Line of Equilibrium
Mass Balance
Energy Balance
Temperature
Caloric Balance
Water Flow
Albedo
Impurities/Contamination
Air/Atmosphere in the vicinity