Chapter 33
Natural Reserves of Water on Earth

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ABSTRACT

The fact that the United Nations has realized the importance of safe drinking water as SDG6 imposes a great responsibility on man to urgently realize the ways and means of conserving water in its natural reserves in pristine form. The chapter describes the geography and geology of sources of water emphasizing their role in the preservation of water in nature. It also suggests ways and means of reducing the 'water footprint' so that people participate in choosing optimal and judicious patterns for using water.

INTRODUCTION

Water is basic for the survival of humans and their civilization on Planet Earth. All of its habitats were crafted by Nature millions of years ago, either by violent geological activities or gradually through the breakdown of rocks through cracks and their erosion and weathering and fluvial action into gravel, sand, sediments, and alluvium (The Fluvial landforms & cycle of erosion, 2014; National Geographic Society, 2012). Important amongst its habitats are: underground aquifers in alluvial soil or in fragmented sedimentary rocks as well as those on the surface in rivers, springs, ponds and lakes, polar ice caps, and glaciers including permafrost. These are all under acute stress as a result of human activities. In this regard, even the primal source of them all – the rains – is not spared as the nature of rainfall has changed in terms of its timing, distribution, and quantity of precipitation.

Until about two and a half centuries back, freshwater was plentifully available with almost guaranteed sustainability in its natural habitats; whatever quantity came out of them continued to be replenished through the hydrological water cycle, which has been running perpetually with remarkable precision.

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Its consumption during this short period has tremendously increased, on account of the huge increase of human population, per se, and for irrigating the expanding farm field areas in order to provide mankind food security as also in a variety of mineral-based, water-guzzling chemical and engineering industries, some of which resulting in its heavy pollution. This period simultaneously witnessed the growth of electric power generation through the combustion of fossil fuels which also pushed up the demand for freshwater. The per capita availability of water is projected to decrease to less than 1150 m^3 in 2050 (World Water Resources by Country, n.d.) which is regarded by WHO as insufficient for healthy living. The consumption of energy and water together, have brought the World to the brink of disaster through unmindful, excessive or unsustainable consumption causing irrevocable destruction of its natural habitats or resources. (Adapted from: Annenberg Learner the habitable planet, n.d.).

The chapter attempts to apprise the reader of the most relevant aspect of water on Earth: its multifarious habitats, to acquaint the reader of how these habitats were created through billions of years of time by violent geological activities or quiescent and gradual breakdown of rocks. This would enable the reader to appreciate and preserve these habitats and aid policymakers, politicians, and bureaucrats to frame policies on water and land use judiciously, considering the preservation of these habitats so that the pristine nature of water is not only preserved but also restored where it has vastly deteriorated.

NATURAL RESERVES OF WATER

Geographically, the resources and habitats of water are inequitably distributed across the world. Its per capita availability in different regions of the World also varies greatly; in many of the tropical and heavily populated countries, it is already less than the minimum considered necessary at 1000 cubic meters per capita per annum in global standards for ensuring healthy life with food security. National and international experts, along with those of international organizations such as the UN, UNESCO, etc. foresee that the water shortages would assume critical dimensions in the foreseeable future i.e.2025-50.

Water issues will necessarily have to be managed at the country level with the understanding that no country will dam the internationally flowing rivers for its exclusive benefit without regard to the needs of countries in its downward passage to the sea. Against this background, it is important to understand how the natural habitats of water were created over the evolutionary timescale. Development of various habitats like underground aquifers in alluvial soil, surface water in rivers, springs, ponds, and lakes, polar ice caps, and glaciers must be understood to fully appreciate their importance and help frame policies on water and land use judiciously, considering the preservation of these habitats so that the pristine nature of water is not only preserved but also restored where it has vastly deteriorated.

DISTRIBUTION OF WATER AMONG ITS NATURAL HABITATS

Water is not static in any of the habitats but continuously changes position from one habitat to another though its habitation time in the different habitats greatly varies with the shortest being in the atmosphere and longest in deep aquifers and in depths of the ocean.