

Biological Invasions in Kashmir Himalayas-A Real Concern

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Abstract: Nature gave birth to life on the floor of planet Earth and then life diversified into a large number of living forms or species on the back of a long temporal continuum. The heterogenous spatial scale of Earth fueled this diversification with high degree of rigidity, evolving an estimated millions of number of species. Man also evolved from the common pool of primitive life into the most complex and developed living being with highly evolved nervous system. Alien species also called exotic, introduced, non-native species are defined as plant species in a given area outside the native distributional range, whose presence is due to intentional or unintentional human involvement. The anthropogenic facilitated dispersal exposes species to new environments. All the introduced species do not survive in the new environment and the niche availability proves decisive. The valley of Kashmir situated in the lap of Himalayas is a beautiful place with sky touching mountains, vast green meadows, lush green forests, pristine streams, chirping birds and all that simulating it as a paradise. The terrestrial ecosystems of Kashmir are equally invaded by these exotic species which are depleting their ecological status and ecological stability. The genetic diversity of many species in these ecosystems is decreasing with every passing day.

[Shabana Aslam and Khursheed Ahmad Ganaie. **Biological Invasions in Kashmir Himalayas-A Real Concern.**

Report and Opinion 2010;2(12):10-12]. (ISSN: 1553-9873).

Keywords: Biological Invasions; Kashmir Himalayas; Nature

Nature gave birth to life on the floor of planet Earth and then life diversified into a large number of living forms or species on the back of a long temporal continuum. The heterogenous spatial scale of Earth fueled this diversification with high degree of rigidity, evolving an estimated millions of number of species. The continental drift stemmed isolated continents in which species evolved to the dictation of their unique physical (abiotic)-biotic environments. This resulted in specific continental biotas, stabilizing particular continental ecosystems. In addition the continents offered huge dispersal or bio-geographical barriers limiting intercontinental species dispersal and thus lending rigidity and uniqueness to the continental biotas and evolutionary processes. This is the geological pattern of biogeography of species and communities entrenched in millions of years. The diversity of a particular continent is uniquely organized on the trophic shelf with unique species-species interaction, across trophic level energy flow and nutrient cycling. This functional or ecological organization and niche specialization of component species lend life and stability to the particular ecosystems. This is Nature's way of running and controlling life, life processes, ecosystem and ecosystem sustaining services. Any disturbance which alters this functional organization strikes the heart of ecosystem, impairing ecosystem functioning, ecosystem stability and survival.

Man also evolved from the common pool of primitive life into the most complex and developed living being with highly evolved nervous system. This gave humans a billion-fold competitive advantage over other forms of life sharing the biosphere with him. To begin with, Man utilized biodiversity for his survival, but this spirit changed with the passage of time. The primitive human pool diversified with increasing populations and increasing demands from the environment. During his evolutionary journey Man accumulated genes of socio-economic, cultural and industrial development which found expressions in the drifting conducive time environments. This genetic tendency drove countries and nations into the mad race of economic development and industrialization. Every country tried to cross the ocean of development briskly but at the cost of environment and biodiversity. Man tried to hijack Nature's native and optimal strategies of life sustenance which left him with his existence jeopardized. We are here highlighting a single anthropogenic interference, alien species introduction and its implications.

According to Pysek et al 2002, alien species also called exotic, introduced, non-native species are defined as plant species in a given area outside the native distributional range, whose presence is due to intentional or unintentional human involvement. The industrial development and globalization bridged

huge distances between continents and countries with modern means of transportation. This high order mobility of human beings served as a dispersing force for living species—plants, animals, insects, bacteria, viruses and other organisms nullifying and overcoming the usual bio-geographical or dispersal barriers which isolated them over millions of years (Davis 2003). Globalization of trade, with enhanced transport, resulted in amplified intercontinental translocation of species (accidental as well as deliberate), causing homogenization or globalization of floras (Drake *et al.* 1989). This has greatly altered the composition of biodiversity in different ecosystems (Vitousek *et al.* 1996; Mack *et al.* 2000).

The anthropogenic facilitated dispersal exposes species to new environments. All the introduced species do not survive in the new environment and the niche availability proves decisive. Some species find the new environmental complex suitable for their growth and reproduction (available niche), and thus get established. Without direct human intervention, some of these non-native species are capable of independent growth, and sustain self-replacing populations. Such plants are categorized as 'Naturalized'. According to Williamson (1996), 10% of these naturalized exotic species turn invasive which means that they produce reproductive offspring often in large numbers and have the potential to spread to large areas (Pysek *et al.* 2004). This group of alien species-Invasive alien species is the nuisance group with tremendous negative ecological and biological implications. In the new introduced habitat the alien species enjoy competitive advantage in the utilization of resources and release from their native range enemies- stiff competitors, pathogens, parasites, predators or herbivores and many more others. This advantage coupled to high fecundity and high clutch size synergistically enhances the proliferation of these alien invasive species which then speedily change the contours of community composition and ecosystem function. This high order reproduction and proliferation of alien invasive species leave the native species in an ecologically suffocating environment with impaired growth and reproduction. In case of animal invasive species, this population explosion in the introduced environment explodes on their prey populations be it plant or animal causing their shrinkage and sublimation to extinction. Thus invasive species are notoriously known for extinction of species and erosion of biodiversity. Globally invasive species are ranked as second worst cause of species extinction and biodiversity loss.

The valley of Kashmir situated in the lap of Himalayas is a beautiful place with sky touching mountains, vast green meadows, lush green forests,

pristine streams, chirping birds and all that simulating it as a paradise. This magnificent beauty and landscape attracts tourists and travelers from all over the globe who partly ferry living species from across the barriers and borders. The valley is therefore witnessing continuous introduction and additions of exotic species with diverse taxonomical background. Besides, various private and government agencies and institutions are importing species from all over the world without bothering or knowing about their detrimental consequences. Talking about the alien plant species, the valley is currently hosting almost eight hundred exotic plant species with almost a hundred of them either invasive or having an immediate invasive potential (Shabana 2009). The Sheri Kashmir University of Agricultural Sciences and Technology (SKAUST) played a significant role in introducing exotic species of plant and animal nature which depleted the native races to extinction. The invaluable local rice varieties were driven to extinction by the exotic races which were introduced by these institutions. These exotic species have brought a good number of plant species into the extinction vortex. The trout is a carnivorous exotic fish which has been proudly introduced into the cold lotic waters of Kashmir. It is playing havoc with the lotic aquatic animal communities and thus lotic ecosystems. The famous Dal Lake is experiencing heat of extinction owing to invasive plant species which are dragging it swiftly on the mat of ecological succession to the woodland stage. The exotic fish species also play this threat game in the apparently still waters of the Dal Lake. The Wular Lake (Ransar site) is also falling prey to this monster of biological invasion.

The terrestrial ecosystems of Kashmir are equally invaded by these exotic species which are depleting their ecological status and ecological stability. The genetic diversity of many species in these ecosystems is decreasing with every passing day. Thus we are silently losing biodiversity at the hands of biological invasion. Going on the economic front, exotic species prove causal in incurring huge economic losses. These species cause reduction in crop productivity as they act as weeds and steal mineral and physical resources. Our rice, mustard and maize fields are studded with these exotic weeds which hamper growth of these crops and reduce their yields. Some exotic pathogens cause diseases to crop plants thereby reducing quality and quantity of the yield. In order to lessen their impact and enhance yield, farmers exploit the ugly services of herbicides and pesticides against these pest exotic species which directly and indirectly affect the health of physico-biotic environment. The macroscopic introductions barely come alone. They carry varied loads of

microscopic bacterial and other living forms which cause diseases of plants, humans, veterinary, poultry, birds and other animals causing huge economic losses. The introduction of Russian Poplar has caused nuisance by dispersing its cottony seeds which caused severe allergy and asthma in the urban and rural populations in Kashmir. Owing to its apparent unhealthful impact, people recently in Srinagar criticized the government and so called experts for introducing it to Kashmir.

The forests of the valley are also getting exposed to the exotic plant and animal species. The social forestry schemes which encourage the plantation of some exotic trees in or near the forests can prove counterproductive by wiping out the coniferous forests. This can have far reaching impact in driving changes in the geography, precipitation regimes, water table and climate of the Valley in addition to changes in the occurrence, expression and expansion of gene pools. We are already witnessing climatic changes in the Valley which can be correlated to the accumulating exotic species over a period of time. It is high time to acquaint people and half baked experts about introduction of alien species which prove devastating for all types of ecosystems. The government needs to take it very seriously lest our ecosystems which are in real sense the identity and face of Kashmir would be lost forever. This can change the whole scenario of life in Kashmir which is currently engaged in resisting and uprooting cultural and political invasion from its sacred soil.

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9/5/2010