Biodiversity: Resources, national capital and politics

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ABSTRACT

This article is a brief summary of biodiversity as a concept and its implementation in the world stage and in Ethiopia. Biodiversity is the lifeline for all and needs to be protected whereby every citizen has a stake. Its history goes back in time as an activism at first that later metamorphosed to a full-fledged science. It further grew as a political discourse amongst the policy-makers and scientists. It was subsequently followed by a number of conventions targeted to protecting biodiversity, some of which were realized and others were not. Ethiopia has a special relevance and place when it comes to biodiversity for the rest of the world because of its unique biodiversity and landscape position. Ethiopia has been a center of origin (and domestication) for some plant species and also a center of diversity for others.

INTRODUCTION

What is biodiversity? When living things differ very much, that situation is termed biological diversity, or biodiversity for short. Officially, biodiversity is defined as the variability of all biological organization at all levels in both aquatic and terrestrial life. Walter Rosen coined the term when organizing the gathering held in Washington D.C. in 1986 with the support of Edward Wilson, "The National Forum on Biological Diversity". The activity was undertaken under the joint auspices of the National Academy of Sciences and the Smithsonian Institute. The group felt that a new catchword was needed to promote nature conservation and to make people aware of the lurking dangers of species extinction (Nieminen, 2001; Sarkar, 2002).

Biodiversity is fundamental for the survival of human beings, be it in agriculture, forestry, industry, export goods, economic output and ecosystem services and functions. The purpose of this review is to show the values and sociopolitical aspects of biodiversity and spark thinking.

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WHY BIODIVERSITY BECAME SUCH AN ISSUE?

The idea started as scientific and/or activism, though originally conceived to be a scientific tool aimed to achieve certain ends: to prevent worldwide loss of species diversity, to alter the world rapid extinction by catalyzing public interests and actions. Biodiversity as an organizing concept started from the need to communicate and act in a concerted effort (Norton, 2003). However, the 1980s discourse immediately boiled and end up in the UN convention (UN CBD 1992).

The Convention on Biological Diversity opened for signature on 5 June 1992 at the United Nations Conference on Environment and Development (the Rio "Earth Summit"). The Convention's three objectives were the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising from the utilization of genetic resources. The Convention has many challenges.

1. Deploy urgent political attention to implementation and support.
2. Concentrate on a core set of actionable targets and national obligations: parties to the Convention on Biological Diversity (CBD) are legally required to develop national strategies and reports. These instruments may sound bureaucratic, but they are the nuts and bolts of an effective global environmental regime.
3. Build a clear vision and a political strategy to fulfill it.
4. May be the fourth is regarding biotechnology. Therefore, during 7-18 December 2022, 196 countries who have signed the agreements are coming together to decide on the best plan of action to reduce biodiversity loss, with a specific obligation on utilizing biotechnology, while limiting its impact on the environment.

THE CONVENTION OF BIOLOGICAL DIVERSITY AND DEVELOPING NATIONS

Originally, the convention acknowledges the special needs of Least Developed Countries (LDCs), among those of other developing countries:

- Preamble: Parties acknowledge, "special provision is required to meet the needs of developing countries, including the provision of new and additional financial resources and appropriate access to relevant technologies" and, in this regard, note "the special conditions of the least developed countries and small island states".
- Article 20.5: Parties commit to taking "full account of the specific needs and special situation of least developed countries in their actions with regard to funding and transfer of technology".

The Convention has two protocols, both of which take into account the needs of, and commit to cooperating with, developing countries and "in particular" those of LDCs and other groups of countries such as small island developing states (SIDS) and parties with economies in transition:

- **Cartagena Protocol** (2003) on Biosafety amid at Convention on Biological Diversity governs the movement of living modified organisms – LMOs – resulting from modern biotechnology from one country to another. In regard to the establishment of a Biosafety Clearing-House, parties committed to assist parties to implement the Protocol, taking into account the special needs of developing countries. It is said that in particular the least developed and small island developing states among them, and countries with economies in transition as well as countries that are centers of origin and centers of genetic diversity" (Article 20). In regard to capacity-building, financial resources and access to and transfer of technology and know-how, parties commit to cooperating in the development and/or strengthening of human resources and institutional capacities in biosafety in developing country parties, "in particular" the LDCs and SIDS among them, and in parties with economies in transition (Articles 22 and 28).

- **The Nagoya Protocol** (2011) is about access to generic resources and the fair and equitable sharing of benefits arising from their utilization. The parties committed to taking into account the needs of, and cooperating with, developing country parties and "in particular" LDCs, SIDS and parties with economies in transition (Article 22 on capacity; Article 23 on technology transfer, collaboration and cooperation; Article 25 on Financial Mechanisms and Resources).

BIO-POLITICS

The reason why it grows fast and we like it or not is a politically charged concept as it invoked to further political agenda. The Convention is the only international instrument comprehensively addressing biological diversity. Then come in conflict with other world trade organization treaties. The first African Union (OAU/ STRC, 2000) Model Laws is a legislative framework that addresses these challenges by harmonizing requirements and processes. Second Cartagena Protocol on Biosafety to the Convention on Biological Diversity has been effective since 2003. Then second took more than a decade and end in Nagoya Protocol on Access and Benefit Sharing (ABS) is a 2010 supplementary agreement to the CBD, 1992. The main topics of international biodiversity politics beside conservation are access to biodiversity and its genetic resources, benefit sharing from its use and intellectual property rights. A major problem of this system is the relationship between varying negotiation processes in different fora. Another closely connected problem is contradictory relationship between different regulatory levels at different spatial scales (international, regional, local). Convention on Biological Diversity (CBD), the International Undertaking on Plant Genetic Resources of the Food and Agricultural

Organization (FAO) and the Agreement on Trade-Related Intellectual Property Rights (TRIPS) in the World Trade Organization (WTO).

What is needed to draw attention to on the development agenda in Ethiopia is how the regulation of biodiversity may function in the future. In the official Ethiopian biodiversity politics, protection and appropriation strategies are normally distinguished. Implementation GEF favored some areas and not others. For the national strategy (IBC, 2005), most successes were reached in the field of protection. The "National Biodiversity Strategy" (IBC, 2005) also puts most emphasis on protection. However, it would be an oversimplification to pose protection and abandoning building of infrastructure into the parks and other tourist sites.

The new sustainable development might be challenged by the new Global-trade thinking. Studies have theorized that, in developed countries, multinational co-operations often relocate "dirty" sectors to developing and emerging economies with far fewer environmental treaties and standards to maximize the profit of the weaknesses of developing and emerging blocs. This idea is known as the 'pollution haven' hypothesis (PHH).

The Aichi 20 Biodiversity Targets in 2011 to offer a framework for 2020:
    1: Awareness of biodiversity increased,
    2: Biodiversity values integrated,
    3: Incentives reformed,
    4: Sustainable production and consumption,
    5: Habitat loss halved or reduced,
    6: Sustainable management of aquatic living resources,
    7: Sustainable agriculture, aquaculture and forestry,
    8: Pollution reduced,
    9: Invasive alien species prevented and controlled,
    10: Ecosystems vulnerable to climate change,
    11: Protected areas increased and improved,
    12: Reducing risk of extinction,
    13: Safeguarding genetic diversity,
    14: Ecosystem services,
    15: Ecosystem restoration and resilience,
    16: Access to and sharing benefits from genetic resources,
    17: Biodiversity strategies and action plans,
    18: Traditional knowledge and customary sustainable use,
    19: Sharing information and knowledge, and
    20: Mobilizing resources from all (Sources: https://www.cbd.int/doc/strategic-plan/targets/T15-quick-guide-en.pdf)

According to the Global Biodiversity Outlook 5 report published by the United Nations in 2020, none of the Aichi biodiversity targets have been achieved at a global level. Out of the 20 goals, only six were partially achieved, 38 have shown progress while 13 have shown no progress. However, the targets such as halving the loss of natural habitats have not been met despite global deforestation rates having decreased by about a third in the past five years compared with pre-2010 levels. Wetlands have continued to disappear and freshwater ecosystems remain critically threatened. The eradication of harmful government subsidies for agriculture, fossil fuels and fishing are barely made, if any, and no progress at all. However, Ethiopia has shown substantial progress in the implementation of the Strategic Plan 2011-2020. It has made substantial progress in the 20 Aichi Biodiversity Targets. The country has registered very good achievements in regard to Aichi Targets 1, 2, 7, 10, 11, 13, 14, 15 and 18, good achievements in regard to Aichi Targets 3, 4, 12, 16, 17 and 19 and fair achievements in regard to Aichi Targets 5, 6, 8 and 9, in the first half of the Plan's period. However, implementation of Aichi Target 20 has been poor (CBD Country Profiles).

Out of the 20 Aichi Biodiversity Targets, Ethiopia has performed "very good", "good", "fair" and "poor" in 9, 6, 4 and 1 targets, respectively (EBI, 2014). How can we get poor in number one unless there is lack of government transparency, given the country received hundreds of million dollars of aid over the years?

BIODIVERSITY IN AFRICA

Africa is home to a rich and diverse animal, plant, and marine biodiversity that provides critical ecosystem services, drives the continent's economy and serves as buffers to climate change. However, the continent is experiencing a dramatic loss of biodiversity. It is estimated that by 2100, climate change alone could cause the loss of over half of African bird and mammal species, as well as trigger a 20–30% decline in the productivity of lakes (the plant and animal life produced by lakes), and a significant loss of plant species.

Even more immediate are the ongoing threats to African biodiversity from natural habitat loss and degradation (especially from agricultural expansion), direct overexploitation of wildlife and fishery species (including from illegal hunting and trade), and the spread of certain non-native invasive species. This loss of biodiversity affects livelihoods, water supply, food security, and lessens resilience to extreme events, particularly for people living in rural areas who are often the poorest.

BIODIVERSITY IN ETHIOPIA

Flora

Ethiopia, complex topography coupled with environmental heterogeneity offers suitable environments for a wide range of life-forms. The flora of Ethiopia is very heterogeneous and has endemic elements. The Semien and Bale Mountains have been identified as areas of plant endemism of continental importance. Their flora is diverse and the Afromontane representative show affinities to South African, Eurasian and Himalayan elements. The Southwestern broad-leaved evergreen forests show affinities to the Congolian forests of western Africa.

Vegetation types in Ethiopia are highly diverse ranging from afro-alpine to desert vegetation. It has a large number of plant species and a recent personal communication indicated that the number of higher plants described is 6021 species (Prof. Sebsebe Demissew) from which about 12% are probably endemic.

Center of origin and/or crops diversity: As a result, due to its geographical position and socio-economic diversity, numerous crop plants known to have originated elsewhere have developed an enormous secondary diversification in the Ethiopian region. Ethiopia is considered as one of the richest genetic resources centers in the world in terms of crop diversity ever since the expedition of the plant collector Vavilov in the 1920s. The country is known as one of twelve Vavilov centers of primary plant domestication in the world. Furthermore, crop plants such as coffee, safflower, *Carthamus tinctorius*, 'tef,' *Eragrostis tef*, 'noog', *Guizotia abyssinica*, 'anchote', *Coccinia abyssinica*, Ethiopian mustard, *Brassica carinata*, enset, *Ensete ventricosum* and coffee, *Coffea arabica* originated in Ethiopia. The country is also a center of diversity for species such as wheat (*Triticum* sp.), barley, *Hordeum vulgare*, sorghum, *Sorghum bicolor*, peas, *Pisum sativum*, cowpea, *Vigna unguiculata*, chickpea, *Cicer arietinum*, lentils, *Lens culinaris*, chat, *Catha edulis*, shiny-leaf buckthorn, *Rhamnus prinoides*, cotton, *Gossypium herbacieum*, castor bean, *Ricinus communis*, oats, *Avena abyssinica* and clover, *Trifolium* sp. Wild relatives also exist for most of these species known to have originated in Ethiopia. Local cultivars/farmers' varieties of several major crops like wheat, field pea, and faba bean, relatives of some of the world's important crops with enormous genetic diversity are abundant in the Ethiopian region.

Fauna

Ethiopia has 284 species of wild mammals and 861 species of birds. Data on other wild animals are scanty; and the number of reptile species identified so far is 201, fish 200, amphibians 63 and arthropods 1,225. Of these animal resources, 29 wild mammals, 18 birds, 10 reptiles, 40 fish, 25 amphibians and 7 arthropod species are endemic to Ethiopia. The Ethiopian Biodiversity Institute (EBI) has done some

limited research in the country, and various animal categories of terrestrial and aquatic origin were recorded, i.e., reptiles (78 spp.), amphibians (54 spp.) and fishes (101 spp.) out of which 3, 17, and 4, were endemic species, respectively (EBI, 2014). Moreover, domestic animal species that are known to have originated elsewhere (mainly in the so-called Fertile Crescent) comprised of 28 cattle breeds, 9 sheep, 8 goat, 7 camel, 6 donkey, 8 horse, 2 mule and 7 chicken (EBI, 2014) and these have developed their own center of secondary diversification. The Ethiopian hare is endemic to Ethiopia , and is found in the Afromontane Biozone of Ethiopia, and in the borders of the Sudanian Savanna Biozone; it also occurs west of the Rift Valley, in the Ethiopian Highlands, and abundantly found around the Lake Tana in Ethiopia (Happold, 2013).

The White-winged Flufftail (*Sarothrura ayresi*), a small, elusive, dove-sized rail endemic to Africa, has been uplisted to Critically Endangered on the IUCN Red List of Threatened Species. According to BirdLife International, the White-winged Flufftail population is undergoing a very rapid and continuing decline, with an estimated total population dropping to below 250 mature individuals. Although the bird's exact range and migratory behavior is still somewhat unclear, the bird is known to occur in Ethiopia and South Africa and there are limited records from Zimbabwe (AEWA. 2013).

Microbes

Although there are no substantial studies on microbial resources, preliminary assessments demonstrate the existence of various types and species of microbes in the country. IBC directorate recorded about 800 microorganisms as of 2016. This diversity of biological resources is a clear demonstration of ecosystem diversity and biological wealth existing in the country. Thus, Ethiopia is also unquestionably a region for microbial diversity.

Ecosystems

Ethiopia's boundaries encompass the major part of the eastern African highland massif. On the northern and western boundaries lie the foothills of the main massif. The Great Rift Valley divides the western and southeastern highlands, and the highlands on each side give way to vast, semi-arid lowland areas in the east and west, especially in the southern part of the country (EFAP, 1994).. The dry areas have isolated the highlands. Ethiopia is endowed with amazing geographic diversity with wide altitudinal and physiographic features ranging from 110 m below sea level at the Danakil Depression (Afar) to 4,533 m.a.s.l. on Mount Ras Dashen (Amhara) with mean annual rainfall ranging from 100 to 2400 mm (Friis *et al.*, 2010). Besides, it harbors a significant portion of the Eastern Afromontane and Horn of Africa

Biodiversity Hotspots and one of the few East African countries that are considered the cradle of humankind (Hopkin, 2005; EWNHS, 2010).

Ethiopia is endowed with a variety of ecosystems (established but incomplete), the recognition of which is mainly based on the twelve vegetation types, and a glimpse of the 12 Ecosystems are: Afromontane Forest: 1. Desert and semi-desert scrubland (below 500 m.a.s.l.); 2. *Acacia-Commiphora* woodland and bushland (900-1900 m.a.s.l.); 3. Wooded grassland of the western Gambella region; 4. *Combretum-Terminalia* woodland and wooded grassland (500 to 1900 m.a.s.l.); 5. Dry evergreen Afromonane forest and grassland complex (1500-2700 m.a.s.l); 6. Moist evergreen Afromontane forest (800 to 2,500 m.a.s.l.); 7. Transitional rain forest (450 to 800 m.a.s.l.); 8. Ericaceous belt (below 500 m.a.s.l.); 9. Afroalpine belt (The lower limit of the afroalpine belt falls at about 3500 m, while the upper limit of vascular plants lies around 5000 m); 10. Riverine vegetation; 11. Freshwater lakes, lake shores, marshes, swamps and floodplains vegetation; 12. Salt-water lakes, lake shores, salt marshes and pan vegetation and the Intermediate evergreen Afromontane Forest.

Values of biodiversity

The diversity of organisms in an ecosystem provides essential food, medicines, and industrial materials. As many as 40 percent of modern pharmaceutical medicines in the developed world are derived from plants or animals. In Ethiopia, no less than 80 percent of the rural community and a significant proportion of the urban dwellers depend on herbal medicines for their primary health care delivery system. In addition to food, medicine, fuel wood, and construction materials, biological resources, especially forests provide wildlife habitat and recreational opportunities, prevent soil erosion and flooding, help provide clean air and water. Biological resources are also important biotic checks to pests and diseases and serve as defense line against global climate change.

Threats to biological resources

As human populations increase and their encroachment on natural habitats expand, humans cause detrimental effects on the very ecosystems on which they depend. In the Ethiopian context, the most drastic damage has occurred in the natural high forests and their biological resources that have once covered more than 42 million ha (35% of total land area) of the land in the country. Unfortunately, human activities have greatly reduced biodiversity around the world. The greatest threat to teff (*Eragrostis tef*) biodiversity is loss of habitat as humans develop land for agriculture, grazing livestock, and unsustainable use such as draining wetlands and clear-cutting forests for agricultural land and polluting the air, soil, and water through unwise use of chemical compounds such as herbicides, insecticides, etc.

Main direct threats to Ethiopia's biodiversity are habitat conversion, unsustainable utilization of biodiversity resources, invasive species, replacement of local varieties and breeds, climate change, and pollution. Indirect causes of biodiversity loss in the country are demographic change, poverty, and lack of awareness and coordination. Thus, about 103 plant, 31 bird, 1 reptile, 9 amphibian, 2 fish and 14 other invertebrate species are threatened.

CONCLUSION

As poverty reduction plan indicates, one of the key approaches is to help people involved to find ways to generate revenues from biodiversity—including through tourism or payments for environmental services—that can cover the cost of managing biodiversity and improving local economies. Biodiversity remains the answer to several sustainable development challenges. From nature-based solutions to climate, health issues, food and water security, and sustainable livelihoods, biodiversity is the foundation upon which we can build back better. The Secretariat of the Convention on Biological Diversity advances the slogan, "Building a shared future for all life".

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