



15 LIFE ON LAND



Biodiversity at Al-Mustaqbal University

2023-2024

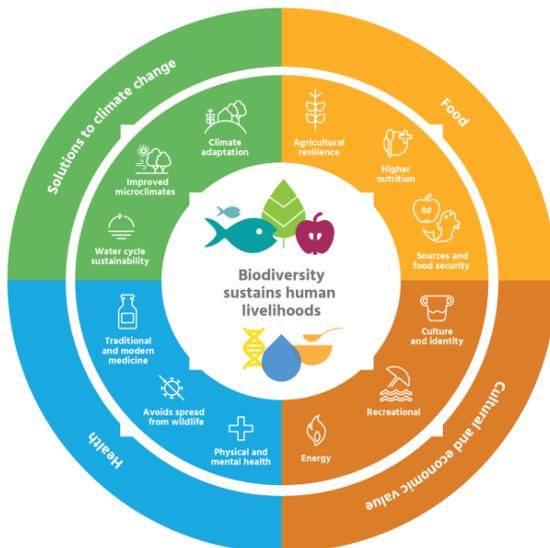


Part 1: Introduction to biodiversity

1. Scientific Background

Biological diversity, or biodiversity, refers to the multitude of life forms on Earth. It includes not only a wide range of organisms—from microorganisms like bacteria and viruses, to larger, more complex organisms such as the blue whale—but also the genetic diversity within and between these species. Furthermore, biodiversity also considers the variety of ecosystems these species inhabit. This diversity creates a complex, interconnected network of biological relationships, forming intricate and dynamic ecosystems within our environment.

Biodiversity provides four main types of benefits to humans: nutritional, cultural, health, and climate related.



Healthy and functional ecosystems play a crucial role in sustaining human livelihoods through providing necessities and benefits such as food, water, energy sources and carbon sequestration, known as 'ecosystem services.'

One study estimates that each year, the goods, and services provided by the planet's ecosystems contribute over USD 100 trillion to the global economy, more than double the world's gross domestic product (GDP). But much debate remains over how to factor in non-monetary values, such as natural beauty, regulating functions, and providing homes for humans and animals.

Underpinning ecosystem services are genetic diversity and biodiversity. Genetic diversity supports agriculture by building resilience and protecting against environmental stresses such as pests, crop diseases and natural disasters. This provides a source of income and safeguards the food security of much of the world's poor.

Biodiversity also plays a role in some 'nature-based solutions' to climate change and problems caused by changes in the environment. These solutions could provide up to a third of the carbon emissions reductions needed to meet the Paris Agreement goals. Including biodiversity in nature-based solutions, though, must be a conscious choice. Tree planting, for instance, can come in the form of monocultures (planting just a single species in a landscape) or agroforestry, which mixes species of agricultural crops and trees in a single landscape to enhance the sustainability of both. While each of these cases offers a different set of financial and environmental benefits, most experts will sing the praises of nature-based solutions that take into account biodiversity over those that don't. And, let us not forget: the planet's various ecosystems and landscapes also hold considerable intrinsic value to humans, whether for their recreational opportunities, their cultural importance to Indigenous communities, or their contributions to physical and mental health. Without biodiversity, these values will be lost.

Biodiversity in Iraq is under threat from several factors, including but not limited to, unregulated hunting and overfishing. These challenges have been identified by the International Union for Conservation of Nature (IUCN) and various academic studies on Iraq's biodiversity. To counteract these threats, the collective efforts of Iraqis are vital, beginning with raising awareness about biodiversity conservation through educational institutions, particularly among the younger generations. Collaboration with relevant government ministries to control and regulate incidents of unregulated hunting is also necessary. Recent events, such as the abduction of wolf pups from various regions for use as pets, have led to a decline in wolf populations, resulting in an increase in pest species like wild pigs, which pose significant economic threats to farming.

Furthermore, traditional medicinal practices and myths, such as the extraction of oils from the Euphrates Softshell Turtle and canine teeth from Grey Wolves, have contributed to a decline in the number of these creatures. Preserving biodiversity calls for a united front among Iraqis, supported by the right laws and regulations to curb such destructive activities. Given its commitment to the Convention on Biological Diversity (CBD), the Iraqi government should spearhead these initiatives.

2. Importance of Species Biodiversity in Iraq

Biodiversity can be discussed at many levels (from genetic material to species to entire ecosystems) and on different scales (local, national, regional, or global). Three specific types of species relate to the global importance of Iraqi biodiversity. These include:

- Migratory species -species for which Iraq is important during one point of their life cycle when they migrate through Iraq);
- Endemic or semi-endemic species - species that are unique to Iraq or regional ecosystems found in Iraq; and lastly
- Species that are endangered, threatened, or vulnerable to extinction.

The IUCN Red List of Endangered Species provides conservation status on many species (both migratory and endemic) that are facing declines and potentially extinction through its on-line Red List (www.iucnredlist.org).

The primary and most up-to-date information on species for Iraq comes from the KBA biannual surveys that have occurred in the country since 2005. A preliminary checklist of the Birds of Iraq has been developed that includes 417 bird species of which 182 are considered passage migrants to Iraq and an additional 27 are vagrant species. Of these, 18 species are considered to be of conservation concern, the majority of which are either possible or confirmed breeders. Five species of birds are either endemic or have endemic races found in Iraq.

NI is currently preparing several papers for publication concerning a wide variety of new records of bird species, new breeding records, and range extensions.

Another group that has received some recent studies are fish species in Iraq. Many marine fish that are important in the fisheries of the Gulf countries utilize the Iraqi marshlands for spawning and nursing grounds making this ecosystem particularly important to regional biodiversity. Some 106 species of fish (including freshwater and marine entrant species) have now been recorded in the non-marine waters of Iraq (Coad et al. in preparation) and of these 53 species are marine fish. According to the Freshwater Ecoregions of the World website (www.feow.org/index.php), three of these fish are endemic in the Tigris/Euphrates Basins ecoregion: Glyptothorax steindachneri; Caecocypris basim, and Iraq blind barb (Typhlogarra widdowsoni). Caecocypris basimi and the Iraq blind barb are endemic genera and species from a cave habitat near Haditha on the Euphrates and are listed as Vulnerable on the IUCN Red List. Another near-endemic cyprinid, Hemigrammocapoeta elegans is probably restricted to the lowlands, as is an undescribed tooth-carp (Aphanius sp.).

Little information exists on other globally important fauna species of insects, amphibians, reptiles, and mammals. KBA Surveys have collected only anecdotal information on these species to date though it is likely that more information exists in Iraq. NI is in the process of verifying the presence of the smooth coated otter in Iraq (an endemic sub-species of this otter, Lutra perspicillata maxwelli, existed in the marshes prior to their desiccation), and the presence of the near-threatened leopard (Panthera pardus) has been verified in the border regions between Iraq and Iran.



A list of ten amphibians, ninety-seven reptiles and seventy-four mammals has been compiled from the literature by NI. Many are conservation concern species and several of these may be endemic or near-endemics such as the vulnerable Mountain newt (*Neurergus crocatus*), the endangered Kurdistan Newt (*Neurergus microspilotus*) and the endangered Euphrates Softshell Turtle (*Rafetus euphraticus*). Twenty species of mammals are of conservation concern and Iraq has two endemic/semi-endemic species: the Mesopotamian gerbil (*Gerbillus mesopotamiae*) and Cheesman's gerbil (*Gerbillus cheesmani*). Again, little is known about their current conservation status.

Plant species in Iraq, which were partially treated in the incomplete Flora of Iraq that was released between the 1960s and 1980s through a joint effort by the Ministry of Agriculture (IMOA) and Kew Gardens in the UK, are now subject to renewed research. KBA surveys were primarily focused on macrophytes of the Marshland areas but when surveys began in Kurdistan, Iraq in 2007, it began collection of terrestrial plants in this botanically rich area. The IMOA and Kew Gardens are now involved in an effort to complete the unpublished volumes of the old Flora of Iraq and a new effort to create a modern Flora is being led by a joint effort between the MOE, NI/TRI, the Royal Botanic Gardens Edinburgh's (RBGE's) Center for Middle East Plants, the Missouri Botanical Gardens and Old Dominion University. The RBGE did an initial review of the published books of the existing Flora of Iraq, the Flora Iranica and work by Zohary in the 1940s. They developed a draft checklist of species for Iraq, with no attempt to update the taxonomy, of over 4500 plants with a secondary list of approximately 195 endemic Iraqi species. There are also local efforts to create regional plants lists (for example, the faculty at the College of Agriculture at the University of Sulaimani have developed a list of the vegetation in the Sulaimani District including medicinal plants).



Iraq must also consider the issue of invasive species and their effects on global biodiversity. As the Millennium Ecosystem Assessment (2005) stated, "The homogenization of biodiversity—that is, the spread of invasive alien species around the world—thus also represents a loss of biodiversity at a global scale (since once-distinct groups of species in different parts of the world become more similar) even though the diversity of species in particular regions may actually increase because of the arrival of new species." As the birthplace of agriculture, Iraq was responsible for exporting important grain crops to the world but exported numerous invasive weed species as well. The on-line Global Invasive Species Database (www.issg.org/database/welcome/), provides a list of 25 species of microorganisms, insects, fish, mammals, herbs, grasses, shrubs, or trees in Iraq that are either invasive to Iraq (13 species) or are native to Iraq and are invasive of other regions (22 species) as well as two invasive species for whom the bio-status is not yet specified. These numbers are likely low estimates and with future study and survey efforts more information on invasive species to and from Iraq will be discovered.

3. Endangered species in Iraq

Iraq boasts a unique biodiversity, particularly in its southern region, it is home to nine of the most important ecological ecoregions in the Middle East. Out of these nine, two are facing the threat of extinction.

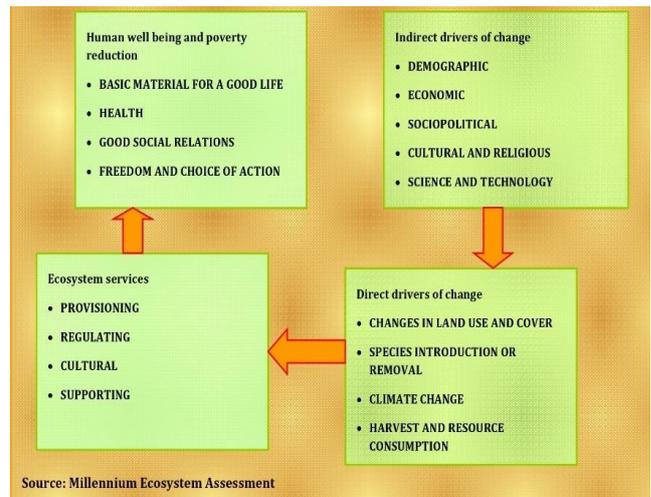
The country is home to a variety of endangered species of flora and fauna, some of which are unique to Iraq. These include the endemic Iraq's Smooth-coated Otter *Lutrogale perspicillata maxwelli* and the Long-tailed Nesokia *Nesokia bunnii*, both listed on the IUCN Red List of Threatened Species, as well as the Euphrates Softshell Turtle *Rafetus euphraticus* and the Basra Reed Warbler *Acrocephalus griseldis*. These species predominantly inhabit the upper and sometimes lower basins of the Euphrates and Tigris rivers. Their high biological value contributes to the recognition of many regions in southern Iraq as international conservation areas, under the Ramsar Convention.

In the western regions of the country, there are various endangered species, including the Haditha Blind Cave Fish *Typhlogarra widdowsoni*, which is critically endangered and unique to this area. The northern areas of Iraq are also home to several endangered plant and animal species such as the Kurdistan Newt *Neurergus derjugini*, which is critically endangered, and the Persian Leopard *Panthera pardus*, an apex predator found in the northern mountains of Iraq. Additionally, a variety of endangered bird species inhabit these areas, notably the Egyptian Vulture, which is listed as endangered on the IUCN Red List and the recently discovered, the rare and elusive Spider-tailed Viper (*Pseudocerastes urarachnoides*) in the foothills of eastern Iraq.



4. Challenges & Threats for Biodiversity Protection in Iraq

Challenges and threats that can affect biodiversity can be distinguished in two categories: indirect drivers of change and direct drivers of change. Some factors such as population increase, technology, and lifestyle can lead to changes in factors that directly affect ecosystems, such as the catch of fisheries or the use of fertilizers to increase production. Such changes in ecosystems may also cause a change in the services that the ecosystems are providing, potentially adversely impacting human health and well-being.



The United Nations Environmental Programme (2003) listed four main threats to biodiversity in Iraq.

- Lack of institutional or legal framework for conservation of biodiversity
- Lack of any effective protected areas network
- Lack of a national biodiversity strategy, or action plan

Many species under threat from ecosystem degradation especially from the loss of the Mesopotamian marshlands and oil spills.

5. Terrestrial Ecoregion Threats & Challenges Tigris-Euphrates Alluvial Salt Marsh

Various large-scale water diversion projects have degraded the Tigris-Euphrates alluvial salt marsh and had major impacts on land-use patterns in this region. These changes were most pronounced in the 1990s but began as far back as the 1950s. Oil and gas production has caused the drainage of large sections of wetlands as well as causing oil spills and pollution related to oil production. The Iran/Iraq conflict also heavily impacted the area particularly along the border region with Iran and the eastern portion of the Central marshes. Agricultural runoff threatens water quality and results in increasing salinity in many areas of this ecoregion. Uncontrolled hunting is a threat to many waterfowl and other fauna, and fishing is also uncontrolled with the prevalent use of electro-fishing.

Arabian Desert and East Sahero-Arabian Xeric Shrublands:

Although less is known about the conservation status of this region, typical threats are changes to traditional land management resulting in overgrazing by camels and goats, off-road vehicles, agricultural and irrigation projects, as well as unassessed impacts from past and current conflicts. The Ministry of Industry and Minerals is currently seeking investments in mining and industrial development that may affect this area (e.g. Petrochemicals and phosphates). Many species have declined or become extinct in this area due to hunting and human encroachment. During at least 2010 large expeditions of hunters/falconers have been entering Iraq from surrounding countries and protected by security forces to hunt MacQueen's Bustard and other prey species without conservation controls or oversight. Reports indicate local eradication of some of these species has occurred as a result of these activities.

Mesopotamian Shrub Desert

Many of the same impacts that affect the previous ecoregion are present in the Mesopotamian Shrub Desert. Most human impacts and threats are often concentrated in areas near river basins and springs/oases. Changes in traditional management that has resulted in water.

irrigation works and associated agriculture and livestock grazing of goats, sheep and camels have had the most significant impacts on biodiversity of this region. Unsustainable fishing is also a problem in the river basins. As with the previous ecoregion, during at least 2009/2010 large expeditions of hunters/falconers have been entering Iraq from surrounding countries to hunt MacQueen's Bustard and other prey species without any conservation controls or oversight.

Middle East Steppe:

There is evidence that this region was once a forest-steppe ecosystem. Relating what travellers to the Sinjar Mountain region wrote 100 years previously, Guest (1966), who took pictures of the same region in the 1933, indicated a history of forest cutting for fuel that had prevented the forest from regenerating and left certain areas abandoned. These past threats may still affect remnant stands of trees within the region but as with the other regions mentioned above, the most important current threats are changes in traditional land management resulting in overgrazing, conversion of remnant steppe ecosystems and wetlands to agriculture and related irrigation, and unsustainable hunting and fishing. The Ministry of Industry and Minerals is currently seeking investments in petrochemicals, fertilizer, phosphate, and sulphur plants. It should be noted that there is already a state company called the Mishraq State Sulphur Mine Plant located within this ecoregion about 40 km southeast of Mosul in an area of high sulphur deposits. On 24 June 2003, a fire accidentally ignited at the Mishraq State Sulfur Mine Plant and burned for approximately three weeks creating a smoke plume containing concentrations of sulphur dioxide (SO₂) and hydrogen sulphide (H₂S) and other contaminants that were visible from satellites. Health effects for exposure to the smoke were assessed but the environmental effects from this fire are unknown. There have been numerous pollution-causing incidents of this type as well as many contaminated sites that exist throughout the site.

6. Freshwater Ecoregion Threats & Challenges

Lower Tigris-Euphrates Basins: Sewage and industrial pollution pose a particular threat to much of the freshwater ecosystems of Iraq as they can spread far from the point of contamination. There are few if any properly functioning sewage treatment facilities in the country and most liquid wastes are simply drained into streams, rivers, and wetlands. In addition, solid waste (municipal and industrial) is simply dumped in ditches and low drainage areas and often burned where they can adversely affect both surface and groundwater resources. Due to the extensive redevelopment and the high demand for construction materials in Iraq, there have been many investments in new greenfield cement projects utilizing available raw materials (limestone) found throughout Iraq. Such projects have been known to cause air pollution that can travel great distances and the drying up of water resources. Gravel mining for these cement factories can cause erosion, destroys riparian habitat and in-stream beds for fish spawning and other organisms, and has potentially significant adverse effects on aquifers and groundwater storage. Nearly all Iraqi rivers have multiple gravel mines along their length. As stated above, the hydrology of lower Iraq has faced significant changes since the 1950s. This includes oil and gas development as well as the drainage of the marshlands. Agricultural drainage from irrigated lands has caused deteriorating water quality and rises in salinity as one travels southward in Iraq. Many communities must rely on reverse osmosis units to obtain any potable water but the increasing salinity has led to extensive changes in flora and fauna as freshwater marshes turn brackish.

7. Direct drivers of changes and their impact on ecosystems, a summary table for Iraq

Direct drivers of change are affecting the ecosystems and therefore the services these provide to society. This knowledge will allow Iraqi to prioritize actions and plans in the drafting process for the NBSAP. In the Table below the background colour of the cells represents the extent to which the ecosystem has changed (going from light yellow to red to represent minor to great change) while the arrows represent the current situation of change taking place (from downwards arrow to upwards arrow to represent decreasing or increasing changes).

Ecosystems/Biodiversity component	Threat				
	HABITAT CHANGE	CLIMATE CHANGE	INVASIVE SPECIES	OVER EXPLOITATION	NUTRIENTS & POLLUTANTS
Tigris-Euphrates Alluvial Salt Marsh	Red	Yellow	Orange	Red	Orange
Arabian Desert and East Sahero-Arabian Xeric Shrublands	Yellow				
Mesopotamian Shrub Desert					
Middle East Steppe					
Zagros Mountain Forest Steppe					
Lower Tigris-Euphrates Basins					
Marine ecosystem					



The Iraqi bird: Pycnonotidae

The Role of Al-Mustaqbal University in protecting Biodiversity in Iraq

Al-Mustaqbal Projects to achieve SDG 15

The Wildlife Sanctuary at Al-Mustaqbal

The Wildlife Sanctuary at Al-Mustaqbal was established in 2020 for students and the community to observe the local biodiversity. The main idea for establishing such a sanctuary was to provide a safe environment for rare animals to flourish and to protect them from the brink of extinction. It represents a home to diverse species such as Iraqi Deer, coyotes, rabbits, desert fox, monkeys, and thoroughbred Arabic horses. In addition, the sanctuary also is a home to some bird species such as ostrich, pigeons, and peacocks. Furthermore, beehives were distributed across the green areas to further the rewilding action at the university.

Care for birds

We have extended our care for wildlife to be inclusive of birds that nest on trees. An extensive campaign was conducted to distribute bird nests, feeders, and water containers on the trees around the university.

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Notable sites for Biodiversity at Al-Mustaqbal University

As the geographical location of Al-Mustaqbal University in a rural area, this makes its site important for the biodiversity. Thus, one of the actions that the university has taken is protect the habitats of the available species in the area. The below sites represent a suitable place for the biodiversity that the university has created including extensive planted trees and green areas.



Notable Species at Al-Mustaqbal's wildlife sanctuary

Iraq is one of the countries that have severe vulnerability to the effects of climate change. This phenomenon has affected the biodiversity in Iraq in an extreme way due to the droughts and sandstorms. Thus, Al-Mustaqbal University has created a large wildlife sanctuary to protect the most endangered species in the Iraqi lands and habitats. The below details and layouts of Al-Mustaqbal's sanctuary.



Notable Species at Al-Mustaqbal's wildlife sanctuary

The species at Al-Mustaqbal's sanctuary

Common Name	Image	Taxonomy group
Iraqi Deer		Artiodactyl family Cervidae
Desert fox		Genus Canis
Rabbits		Leporidae family
Monkeys		Cercopithecoidea
Arabic horses		
Maine Coon cat		Felidae

Love birds	 A photograph of two lovebirds, likely a species of parakeet, with green bodies and reddish-brown heads, facing each other and touching their beaks.	Psittacidae
Peacocks	 A photograph of a peacock standing on a tiled floor, showing its characteristic blue and green body and long, patterned tail feathers.	Phasianidae
Bees	 A close-up photograph of a beehive, showing a dense cluster of bees on a wooden structure.	Apidae
Flamingo	 A photograph of two flamingos standing in shallow water, with their long necks and legs visible.	Phoenicopteridae

Raising the awareness of the community and students towards the biodiversity

- An awareness tour for first-stage students inside the university's animal sanctuary, which includes a wide range of animals, including predators and pets, in addition to purebred Arabian horses, gazelles, birds, and a variety of other animals.



- A collaborative research work with the local agriculture directorate in Babylon city about the animals in the sanctuary.





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