

Study of Controlling methods of invasive species in India

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Abstract: Intrusive species are creatures or plants from another district of the world that don't have a place in their new condition. They can be acquainted with a range by transport counterbalance water, inadvertent discharge, and frequently, by individuals. Obtrusive species can prompt the termination of local plants and creatures, crush biodiversity, and for all time change natural surroundings. People have been transporting creatures and plants starting with one a player on the planet then onto the next for a large number of years, some of the time intentionally for social or individual pick up and in some cases coincidentally. Much of the time, such presentations are unsuccessful, however when they do end up plainly settled as an intrusive outsider species (characterized by IUCN (2000) as "an outsider species which winds up plainly settled in regular or semi-normal environments or living space, is an operator of progress, and undermines local natural decent variety"), the results can be calamitous. As per the Convention for Biological Diversity, obtrusive outsider species are the second biggest reason for biodiversity misfortune on the planet and force high expenses to horticulture, ranger service, and oceanic environments. Actually, presented species are a more prominent risk to local biodiversity than contamination, collect, and illness consolidated. The worldwide degree and fast increment in intrusive species is homogenizing the world's widely varied vegetation (Mooney and Hobbs, 2000) and is perceived as an essential driver of worldwide biodiversity misfortune. Bio-intrusion might be considered as a type of natural contamination and noteworthy part on worldwide change and one of the significant reasons for species elimination.

Keywords: Invasive species. Behavior, control, Indian environment

I. INTRODUCTION

A prominent species is a plant, living being, or animal species that is not nearby to a specific region (an introduced species), and which tends to spread to a degree acknowledged to make hurt the earth, human economy or human health.[1]

One examination raised for the most part divergent perspective of the criteria for prominent species among experts (p. 135) and stresses with the subjectivity of the articulation "meddling" (p. 136).[2] Some of the substitute usages of the term are underneath:

The term as every now and again used applies to introduced species (in like manner called "non-indigenous" or "non-nearby") that unfairly impact the living spaces and bioregions they assault fiscally, normally, or organically. Such prominent species may be either plants or animals and may steamed at charging a district, wild ranges, particular situations, or wildland-urban interface land from loss of trademark controls, (for instance, predators or herbivores). This fuses non-nearby prominent plant species named as unprecedented annoyance plants and nosy exotics creating in neighborhood plant communities.[3] It has been used as a piece of this sense by government organizations[4][5] and moreover assurance get-togethers, for instance, the International Union for Conservation of Nature (IUCN) and the California Native Plant Society.[2] The European Union portrays "Meddlesome Alien Species" as those that might be, immediately, outside their trademark flow run, and besides, undermine regular diversity.[6][7] It is in like

manner used by means of arrive chiefs, botanists, researchers, horticulturalists, progressives, and general society for noxious weeds.[8] The kudzu vine (*Pueraria lobata*), Andean Pampas grass (*Cortaderia jubata*), and yellow starthistle (*Centaurea solstitialis*) are cases.

A substitute use extends the term to join indigenous or "nearby" species close by non-neighborhood species, that have colonized normal reaches (p. 136).[2] Deer are a case, thought to overpopulate their neighborhood zones and connecting provincial greenery fenced in areas, by some in the Northeastern and Pacific Coast zones of the United States. As a rule the term is used to depict a non-nearby or displayed species that has ended up being sweeping (p. 136).[2] However, few out of each odd exhibited species effectsly influences the earth. A nonadverse case is the typical goldfish (*Carassius auratus*), which is discovered all through the United States, however from time to time finishes high densities (p. 136).

Prominent species can hurt both the typical resources in a natural group and furthermore undermine human use of these benefits. A prominent species can be familiar with another domain by methods for the adjust water of oceangoing pontoons, ponder and accidental entries of aquaculture species, aquarium cases or drive, and diverse means. Meddlesome species are fit for causing annihilations of neighborhood plants and animals, lessening biodiversity, matching nearby life frames for obliged resources, and evolving regions. This can realize colossal fiscal impacts and significant interferences of shoreline front and Great Lakes conditions:

Ailments, organisms and parasites

Prominent ailments, developments and parasites in Australia impact various neighborhood plants and animals and rustic items. Routinely when plants and animals have come into contact with displayed diseases, living beings or parasites they don't respond well to treatment. Vaccinations are frequently incredibly expensive to convey and are not achievable to apply widely to wild animals. A couple of afflictions have added to important hardships of species inciting a couple of creature assortments getting the opportunity to be evidently weakened or ended..



Fig 1 Cockatoo infected by psittacine circoviral disease
A segment of the disorders, living beings and parasites at present of worry by virtue of their impact on neighborhood species include:

- Chytrid land and water capable life form – Chytridiomycosis
- Mundulla Yellows
- Myrtle Rust (*Puccinia psidii*)
- Phytophthora cinnamomi illness
- Psittacine mouth and tuft affliction (psittacine circoviral disease)

Illnesses, developments and parasites can impact the soundness of nearby species, diminishing their ability to copy or survive. Weakened species with reduced and limited peoples as a result of various factors are particularly vulnerable against scenes caused by these introduced animals. For undermined species even a little diminishing in the amount of young being considered, or of individuals accomplishing adulthood, can incite the conceivable destruction of the species

Non domesticated creatures

The Australian Government works with the states and regions to create systems, embrace research and store key administration exercises. Under the Environment Protection and Biodiversity Conservation Act 1999, various non domesticated creatures are perceived as dangers to local creatures and plants. The effects of some non domesticated creatures have been recorded as Key debilitating procedures and a danger reduction design has or might be produced.



Fig 2 Feral animals

Some different creatures, for example, non domesticated camels, are additionally the subject of national gets ready for administration as Existing Pest Animal of National Significance, (under the Australian Pest Animal Strategy)

Creepy crawlies and different spineless creatures

Presented creepy crawlies and different spineless creatures that are as of now in Australia, and which can detrimentally affect the earth, include:

- Invasive honey bees
- Tramp ants



Fig 3 Asian honey bee workers

Likewise with other intrusive irritations, once settled crosswise over Australia, acquainted spineless creatures are troublesome with annihilate.

Presented marine bugs

Presented marine bugs are species moved to a region outside their regular range, by and large by human exercises, and that undermine the earth, human wellbeing or financial esteems.

Marine nuisances are acquainted with Australian waters and translocated inside our waters by an assortment of means; including weight water released by business shipping, bio-fouling on structures and inside inward seawater funnels of business and recreational vessels, aquaculture operations (coincidentally and deliberately), aquarium imports, and also marine flotsam and jetsam and sea streams.

Weeds

Intrusive weeds are among the most genuine dangers to Australia's regular habitat and essential generation businesses. They dislodge local species, contribute essentially to arrive debasement, and diminish homestead and woodland efficiency. Australia invests significant energy and cash every year in fighting weed issues and securing biological communities and essential generation on private and open land..

II. THREATS TO BIODIVERSITY

An obtrusive species is characterized legitimately in the USA as "An outsider species whose acquaintance does or is likely with make financial or ecological mischief or damage human well being... 'Outsider species' methods, concerning a specific biological system, any species... that is not local to that environment." Non-local species can be added to a group either by regular range augmentations or in light of the fact that they are presented because of human movement. Most non-local species have unsafe natural impacts; these are alluded to as obtrusive species. Essentially all biological systems are in danger from the hurtful impacts of presented intrusive species (additionally observe outlandish species, marine obtrusive species, and sea-going obtrusive species).

Obtrusive species are a noteworthy danger to our condition since they (1) can change living spaces and adjust biological community capacity and environment administrations, (2) swarm out or supplant local species, and (3) harm human exercises, costing the economy a huge number of dollars. For instance, expenses to agribusiness, ranger service, fisheries, and other human exercises by presented species are assessed at \$137 billion every year to the U.S. economy alone. Obtrusive species rank second just to living space pulverization, for example, deforestation, as a risk to biodiversity. Half of the species in the United States that are in danger of eradication are jeopardized in light of the impacts presented species alone or in light of their effects joined with different procedures. Truth be told, presented species are viewed as a more noteworthy risk to local biodiversity than contamination, reap, and ailment joined. Intrusive species debilitate biodiversity by (1) causing malady, (2) going about as predators or parasites, (3) going about as contenders, (4) adjusting territory, or (5) hybridizing with nearby species.

Ailment

Unplanned presentation of the Asian chestnut scourge parasite by means of the nursery exchange practically wiped out American chestnut from more than 180 million sections of land of eastern United States backwoods in the main portion of the twentieth century. This annihilation caused an entire scale change of the Eastern deciduous timberland biological system, which was commanded by American chestnut. The loss of chestnuts was a catastrophe for some creatures that were very adjusted to live in woods commanded by this tree species. For instance, ten moth species that could live just on chestnut trees ended up noticeably wiped out.

Predators

Obtrusive predators can seriously decrease the populace sizes of local species, or even drive them wiped out, in light of the fact that local prey species might not have advanced barriers against the novel predators:

The ruthless darker tree wind was acquainted with Guam in freight from the Admiralty Islands. Predation by dark colored tree snakes dispensed with ten of the eleven local feathered creature species endemic to the woodlands of Guam. The Nile roost, a ravenous predator, was acquainted with Lake Victoria in Africa as a sustenance angle. Predation from the Nile roost has disposed of more than one hundred types of the staggering local cichlid fishes of Lake Victoria.

Obtrusive herbivores can cause incredible harm. For instance, goats were acquainted by mariners with numerous remote maritime islands amid the period of European nautical investigation, to give a wellspring of sustenance when the islands were returned to. Goats acquainted with the island of St. Helena in the sixteenth century disposed of over a large portion of the endemic plant species.

North American dark squirrels are driving local red squirrels to elimination in Great Britain and Italy. The presented squirrels scrounge for nuts more effectively than the local species, conceivably prompting the passing of a local animal types.

Zebra mussels were unintentionally conveyed to the United States from Russia in the weight of boats. Zebra mussels modify amphibian territories by separating a lot of water, in this way diminishing densities of planktonic creatures and settling in thick masses over immense ranges. No less than thirty freshwater mussel species are undermined with elimination by rivalry from the zebra mussel.

Hybridization

Hybridization happens when individuals from two distinct species mate with each other and deliver suitable posterity that convey qualities from the two guardians. At the point when an intrusive species is significantly more inexhaustible than a local relative, they may hybridize so regularly that the intruders qualities "surge" the local species, with the end goal that no people contain the whole genotype of the local species, along these lines adequately driving the local species to termination. It is conceivable that hybridization is regular in such cases on the grounds that the local species has not experienced choice for conceptive separating instruments to avert hybridization with the trespasser. Of the 26 known creature species in the USA that have become terminated since being recorded under the Endangered Species Act, no less than three were entirely or incompletely lost due to hybridization with intruders. For instance, hybridization between Introduced mallards and the local Hawaiian duck and between the rarest European duck (the white-headed duck) and the intrusive North American bronzed duck may bring about the eradication of the local species.

Attack Meltdown

Frequently attacking species collaborate with each other to create an issue where either animal types alone would be safe, an idea known as intrusion emergency. Decorative fig trees planted in Miami did not spread since they were sterile on the grounds that they did not have the wasp species required for fertilization. Be that as it may, in the mid 1990s a wasp animal categories equipped for treating the figs freely attacked the district, so now the figs are fit for imitating and spreading.

III. CONTROLLING INVASIVE SPECIES

Strategies used to control invasive species include (1) keeping potential invaders out, (2) eradicating potential invaders soon after invasion, (3) biological control, (4) chemical control, and (5) mechanical control.

Keeping potential invaders out

Keeping potentially damaging invaders out in the first place is the most cost-effective way to deal with introduced species. The ability of new species to invade can be reduced by monitoring the common invasion pathways such as ship ballast water, wooden packing material, and horticultural plants.

Eradicating after invasion

It is easier to eradicate invasive species if they are discovered quickly and population levels remain low. Even if it proves impossible to totally eliminate an invader, early intervention can keep the population sizes of invaders at acceptably low levels. For example, Giant African Snails were effectively eliminated from Florida. Currently researchers in California are attempting to eradicate the marine green alga *Caulerpa* which has recently invaded that region.

Biological control

Biological control involves introducing an enemy of an invasive plant (i.e., a disease, parasite, predator, or competitor) in an attempt to lower the population size of the invader.

Sometimes introducing a natural enemy from the native range of the introduced pest can be effective. For example, prickly pear cactus that invaded Australia from the Americas has been effectively controlled by introducing a moth from South America whose caterpillar feeds on the cactus. In other cases the most effective control comes from finding an enemy from a different area (a novel association) because the invader may not have evolved any defenses to such species with which they have never been in contact. For example, a virus from South America has been used to control European Rabbits in Australia.

A disadvantage of biological control is that some agents attack nontarget species, becoming noxious invaders themselves, and it is very difficult to remove a

troublesome introduced natural enemy once it is established.

Chemical control

Chemical control involves using chemical pesticides to kill invaders. Although chemicals can effectively control some species (for example, water hyacinth in Florida), chemical control has some problems. For example pesticides may affect non target species. Chemical control can be expensive and may only be effective for a limited amount of time because pests can evolve resistance to the pesticides.

Mechanical control

Mechanical control involves using machinery or human effort to remove invaders. Mechanical control has been an effective control strategy for invasive *Tamarix* in the Southwestern US (*Tamarix* control). Volunteer convict labor has been used in Florida to cut paperbark trees and in Kentucky to rip out Eurasian musk thistle.

The newest technology for managing invaders is ecosystem management, in which the entire ecosystem is subject to a regular treatment (such as a simulated natural fire regime) that tends to favor adapted native species over most exotic invaders. Because it is so new, the specific ways in which ecosystem management can be employed must be determined in each type of habitat.

IV. INVASIVE SPECIES PROBLEM IN INDIA

In 1993, the International Convention on Biological Diversity (CBD) came into legitimate impact to save organic assorted variety, guarantee that natural decent variety would be utilized reasonably and that its advantages would be shared fairly. The Conference of Parties (CoP), the representing body responsible for actualizing the CBD's choices, is presently meeting for the thirteenth time at Cancun, Mexico. One thing on the motivation, amid the two-week meeting that began on December 4, is an audit of advance on the Strategic Plan for Biodiversity (2011-2020) and the related Aichi Biodiversity Targets. The arrangement and targets were embraced amid the tenth CoP at Nagoya in Japan's Aichi prefecture, in 2010.

The National Biodiversity Strategies and Action Plans (NBSAP) – planned by CBD-signatory nations, including India – were reconsidered and refreshed in view of the Strategic Plan for Biodiversity and the Aichi Targets and as per national needs and limits. India has embraced Aichi Target 9 as its National Biodiversity Target 4 – i.e., to recognize intrusive outsider species and their pathways of presentation, and to create systems to oversee organized obtrusive outsider species by 2020. It is vital to now examine protection and prosperity challenges postured by obtrusive species in India, consider the condition of intrusive species administration, arrangement and

rehearse and give recommendations referring to worldwide prescribed procedures.

Unique attacks

Despite the fact that intrusive outsider species are a perceived danger to biodiversity – one that merits its own particular biodiversity target – the term 'obtrusive outsider species' (or just 'intrusive species') stays unfamiliar to numerous. 'Outsider' alludes to species that have been acquainted with locales outside their local range. This is not unordinary. A considerable lot of the yields we develop, natural products we eat, filaments we utilize and creatures we tend have their roots somewhere else. Individuals have constantly moved species around, purposefully or incidentally. A subset of presented animal categories however can at times wind up plainly tricky, causing untold environmental and financial harm. These alleged 'intrusive species' are a quickly developing issue in a quick globalizing world where, with expanding exchange and travel, the rates of species prologue to new situations is presently verifiably phenomenal.

Obtrusive species undermine biodiversity and environment forms, with immediate and backhanded effects on human prosperity. They smother local biodiversity and cause neighborhood annihilations. They modify natural life living space. They influence vocations specifically by smothering species that individuals rely upon (e.g., non-timber backwoods items, 'NTFP') and by infringing on private and normally held rural and brushing land. They influence vocations and prosperity in a roundabout way by changing hydrology, harming soils, influencing the provisioning of biological system administrations, and because of expenses brought about in their control or administration.

In the Western Ghats, for instance, (*Lantana camara*), a Central and South America bush that was acquainted with India in 1809 as a garden decorative, has spread broadly. In Karnataka's Biligiri Rangaswamy Temple Tiger Reserve, Soliga agriculturists have experienced decreased plenitudes of NTFPs, for example, amla, which they collected for supplementary pay. *Lantana* additionally influences recovery of other woods plants that wild herbivores relied on. Also, pig attacks of millet and maize crops have radically expanded related with the spread of *lantana*.

Lantana's container Indian nearness is coordinated just by (*Prosopis juliflora*), differently known as *vilayati keekar*, *gando bawar* and *seemai karuvel* in various parts of the nation. Additionally from South America, this prickly tree was acquainted with India around 1870 for its outrageous dry season resistance and as a wellspring of fuelwood. It has now settled its commanding nearness in India's bone-dry to semi-dry conditions of Rajasthan, Gujarat, Maharashtra, Tamil Nadu, Andhra Pradesh and Karnataka. In parts of Tamil Nadu, the attack has totally changed agrarian grounds and touching house,

constraining individuals to look for new employment openings influencing *prosopis* to charcoal and other little wood items.



Figure 4 *Lantana camara*, an invasive species, in Kilakottai, Tamil Nadu.

In the Banni fields of Kutch, comparably, the Forest Department's presentation of *prosopis* since the 1960s – to apparently counter desertification – has changed both scene and employments. The prairies are presently a *prosopis* forest and the nearby Maldhari pastoralists have gone from being raisers of the Kankrej, a conventional cows breed less ready to withstand *prosopis*, to drain makers and rearers of the stronger Banni wild ox. Both Maldharis and non-Maldharis have additionally needed to receive charcoal generation to balance the loss of conventional vocations.

However, the wild oxen of another peaceful individuals, the Toda of the Nilgiris, have not adapted too under intrusive conditions. Once an undulating verdant level, the Nilgiris have been afforested with species like wattle (intrusive Australian acacias). Alongside plants, for example, gorse and *cestrum*, wattle was presented for decorative purposes by the British. It has rendered a significant part of the upper Nilgiri prairies woody and prickly, exhausting an once-inexhaustible Toda domesticated animals. While *cestrum* has attacked shola backwoods that lie in the folds of fields and house old Toda settlements and sanctuaries, wattle and gorse bushes fill in as natural surroundings for panthers and tigers that go after bison.

It is not just plants that can end up noticeably intrusive. For instance, the goliath African snail, a couple of which was conveyed to India from Mauritius as an anomaly, now happens in huge numbers in ranges as far off as Assam and Kerala, making huge harm an assortment of yields. There are likewise various outsider fish – the dark colored trout, the Mozambique tilapia, the African catfish and numerous others – presented at various circumstances for wear, the aquarium exchange or aquaculture. These have spread through streams and wetlands from the Himalayas toward the Western Ghats, causing nearby annihilations

of uncommon and imperiled local fish and influencing customary fisheries.

In 2001, business analysts endeavored to gauge the expenses of harms caused by obtrusive species to horticulture and ranger service. They put this figure at about \$91 billion a year in India alone. This is a think little of, best case scenario and does not represent the expenses of intrusive species administration and control, not to mention the expenses of neighborhood species terminations, modifications in natural working and decrease in biological community administrations. However it is demonstrative of the extent of harm caused by intrusive species.

V. MANAGING INVASIVE SPECIES

In the most recent decade, there have been endeavors to arrange arrangements of obtrusive plant species in India and to think about the effects of intrusive species in various parts of the nation. In 2009, the Indian Council for Forestry Research and Education set up a Forest Invasive Species Cell to create capacities with regards to obtrusive species administration and to make a database on intrusive animal types. This cell seems to have stopped to exist since. A coordinated timberland assurance conspire was conceived to incorporate the administration of obtrusive species. The last tiger statistics directed by the National Tiger Conservation Authority incorporated an overview of the dispersion of a subset of obtrusive plants in tiger scenes the nation over. Furthermore, the twelfth five-year design proposed a national intrusive animal varieties observing framework. These endeavors, however welcome, stay disengaged activities.

VI. CONCLUSION

We have various distinctive enactments identifying with intrusive species. Some of these were established some time before obtrusive species were a worldwide concern – however have since been altered to incorporate intrusive species. A demonstrative, however fragmented, list incorporates the Plant Quarantine (Regulation of Import into India) Order 2003; The Destructive Insects and Pests Act, 1914 (and revisions); Livestock Importation Act 1898 and the Livestock Importation (Amendment) Ordinance, 2001; Environment Protection Act 1986; and The Biological Diversity Act 2002.

So additionally, we have various distinctive offices accused of keeping the presentation of obtrusive species and for administration and control of intrusive species. These incorporate the Ministry of Environment Forests and Climate Change, the National Bureau of Fish Genetic Resources, the Plant Quarantine Organization of India and different branches of the Ministry of Agriculture. This circumstance – "everyone's obligation, along these lines no one's duty" – is a long way from perfect. We truly require a solitary, far reaching legitimate and approach

system on obtrusive species and a solitary nodal office in charge of its coordination and usage.

We additionally require a planned national push to stock and archive obtrusive species a rundown of outsider animal types, as well as the pathways by which they were presented, the natural qualities that make them intrusive, and their environmental and financial effects. This will empower us to better screen and manage the in all likelihood courses by which species touch base, and empower a hazard appraisal of potential obtrusive species before presentation. Since time is running short slack between species presentation and attack, a complete documentation would likewise empower preemptive appraisal of outsider species yet to end up noticeably intrusive.

Such a national exertion is too enormous an assignment for any one office to complete, however it could be accomplished – as was done in Europe with the Delivering Alien Invasive Species Inventories for Europe: if government offices, colleges, and government and non-legislative research foundations hold hands. On the off chance that we are not kidding about endeavoring to meet our national focus on intrusive species by 2020, as we have focused on doing, an opportunity to act is currently.

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