VIT UNIVERSITY
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Module -2
Biodiversity

BY

DR. V. SAI SARASWATHI., M. PHARMA., PH. D.,

ENVIRONMENTAL SCIENCE PROFESSOR,

ASST. PROF. (SR.), SAS,

VIT UNIVERSITY, VELLORE- 632014

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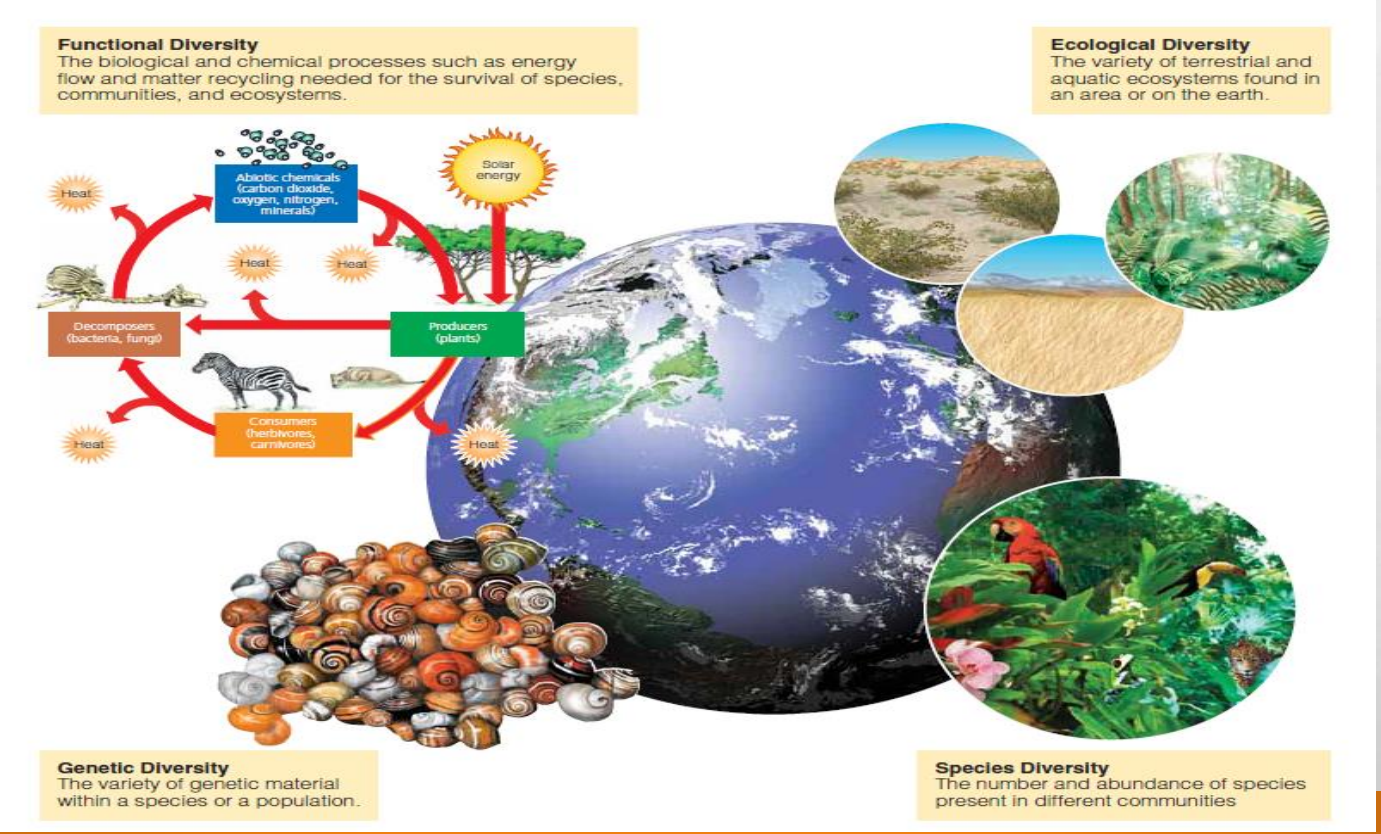
INTRODUCTION- BIODIVERSITY

- BIODIVERSITY OR BIOLOGICAL DIVERSITY IS THE DIVERSITY OF THE EARTH' S SPECIES, GENES THEY CONTAIN, THE ECOSYSTEM IN WHICH THEY LIVE, AND ECOSYSTEM PROCESSES OF ENERGY FLOW AND NUTRIENT CYCLING THAT SUSTAIN ALL LIFE.



IMPORTANCE OF BIODIVERSITY

- THE EARTH'S BIODIVERSITY IS A VITAL PART OF THE NATURAL CAPITAL THAT HELP TO SURVIVE ALL ECOSYSTEM.
  - FOOD
  - WOOD
  - FIBER
  - ENERGY
  - MEDICINES
  - ECONOMIC WEALTH
  - QUALITY OF WATER
  - AIR
  - FERTILITY OF SOIL
  - DISPOSE OF WASTE
  - CONTROL OF PESTS

TYPES OF BIODIVERSITY

- GENETIC DIVERSITY: PROVIDES A VARIETY OF GENES THAT ENABLE LIFE ON THE EARTH TO ADAPT TO AND SURVIVE DRAMATIC ENVIRONMENTAL CHANGES.
- ECOSYSTEM DIVERSITY: THE EARTH'S VARIETY OF DESERT, GRASSLANDS , FOREST AND MOUNTAINS, OCEANS, LAKES, RIVERS AND WETLANDS IS THE MAJOR COMPONENTS OF BIODIVERSITY.
- FUNCTIONAL DIVERSITY: THE VARIETY OF PROCESSES OF MATTER CYCLING AND ENERGY FLOW WITHIN ECOSYSTEMS AND BIOSPHERE.

INDIA –MEGA BIODIVERSITY

India as a Mega Diversity region

- India is one of 12 mega diversity countries of world.
- It has 47,000 species of plants and 81,000 species of animals.
- Many endemic plants and animals.
- Centre of origin of many flowering and crop plants.
- Great marine diversity due to 7500 km long coastline

Sapria himalayana(parasitic angiosperm)

INDIA- MEGA BIODIVERSITY

- 10TH RANK AMONG PLANT RICHNESS
- 11TH – ENDEMIC SPECIES OF HIGHER VERTEBRATES
- 6TH IN CENTRES OF DIVERSITY AND ORIGIN OF FOOD CROPS
- INDIA IS ONE OF THE 12 MEGA BIODIVERSITY NATION
- 5000 SPECIES ARE THERE OF FLOWERING AND 320 SPECIES OF FOOD PLANTS
- MARINE BIODIVERSITY IS STILL TO BE EXPLORED
- 45,000 PLANT SPECIES- 7% WORLD'S CONTRIBUTION
- 81000 ANIMAL SPECIES- 6.5 % FAUNA

SPECIES INTERACTION - TERMS

- **EXTINCTION: THIS AFFECTS THE NUMBER AND TYPES OF SPECIES ON THE EARTH- ENTIRE SPECIES CEASES TO EXIST.**
- **ENDEMIC SPECIES: SPECIES FOUND IN FEW AREAS ONLY.**
  - **EXIST IN ISLANDS AND TROPICAL RAIN FOREST.**
  - **EG: GOLDEN TOAD – FOUND IN COSTA RICA'S MOUNTAINOUS REGION. IN 1989 IT BECAME EXTINCT.**
  - ***REASON*: WARMER AIR FROM GLOBAL CLIMATE CHANGE CAUSED THE AREA'S MOISTURE BEARING CLOUDS IN CARIBBEAN SEA TO RISE AND DRY OUT THE HABITAT FOR THIS FROG.**

Michael P. Fogden/Bruce Coleman USA

Figure 4-7 Depleted natural capital: male golden toad in Costa Rica's high-altitude Monteverde Cloud Forest Reserve. This species has recently become extinct because changes in climate dried up its habitat.

EXTINCTION

- **BACKGROUND EXTINCTION: SPECIES DISAPPEAR AT A LOW RATE**
  - **BIOLOGIST ESTIMATE THE AVERAGE ANNUAL BACKGROUND EXTINCTION RATE IN ONE TO FIVE SPECIES FOR EACH MILLION SPECIES ON THE EARTH.**
- **MASS EXTINCTION: SIGNIFICANT RISE IN EXTINCTION RATE.**
- **THIS LEADS TO EVOLUTION OF NEW SPECIES.**
- **AS ENVIRONMENTAL CONDITIONS CHANGES, THE BALANCE BETWEEN FORMATION OF NEW SPECIES AND EXTINCTION OF EXISTING ONES DETERMINES THE EARTH'S BIODIVERSITY.**

TYPES OF SPECIES EXTINCTION

- **LOCAL EXTINCTION**: WHEN A SPECIES IS NO LONGER FOUND IN AN AREA. BUT STILL FOUND ELSEWHERE IN THE WORLD.
- **ECOLOGICAL EXTINCTION**: FEW MEMBERS OF A SPECIES ARE LEFT AND IT CAN NO LONGER PLAY ITS ECOLOGICAL ROLES IN COMMUNITIES.
- **BIOLOGICAL EXTINCTION**: SPECIES IS NO LONGER FOUND ANYWHERE ON THE EARTH.

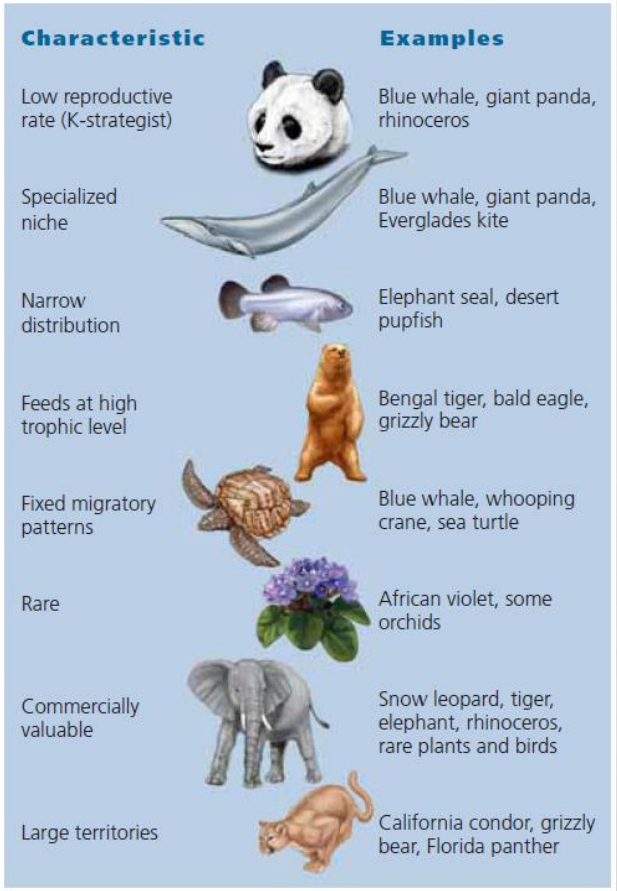


Figure 9-4 Characteristics of species that are prone to ecological and biological extinction.

CAUSE FOR PREMATURE EXTINCTION

- **HIPPCO-**
  - H- HABITAT DESTRUCTION, DEGRADATION AND FRAGMENTATION
  - I- INVASIVE
  - P- POPULATION GROWTH
  - P- POLLUTION
  - C- CLIMATE CHANGE
  - O- OVER EXPLOITAION

HUMAN ACTIVITIES – PREMATURE EXTINCTION OF SPECIES

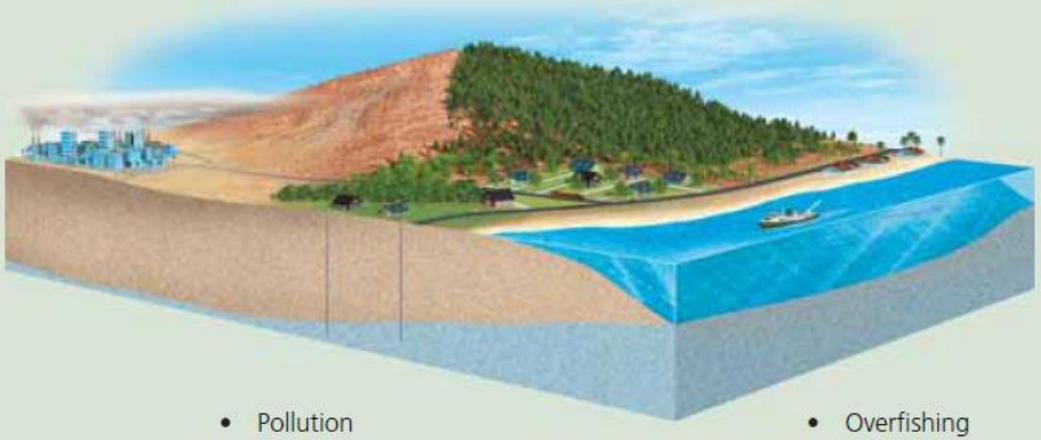
- ACCORDING TO BIOLOGIST: AS POPULATION AND RESOURCES CONSUMPTION INCREASES OVER NEXT 50 YEARS OUR ECOLOGICAL FOOT PRINT WILL EXPAND LIKELY.
- PREMATURE EXTINCTION WILL BE THERE FOR CURRENT SPECIES BY 2050.
- THIS WILL LEAD TO DEGRADE AND DEPLETE THE NATURAL CAPITAL THAT SUPPORTS ALL LIFE.
- IT TOOK MILLION'S OF YEARS FOR MASS EXTINCTION.
- WE ARE DEGRADING THE TROPICAL FOREST, CORAL REEFS AND WETLANDS- CENTERS FOR FUTURE SPECIATION.

CAUSES OF DEPLETION-PREMATURE EXTINCTION

Causes of Depletion and Premature Extinction of Wild Species

Basic Causes

- Population growth
- Rising resource use
- Undervaluing natural capital
- Poverty

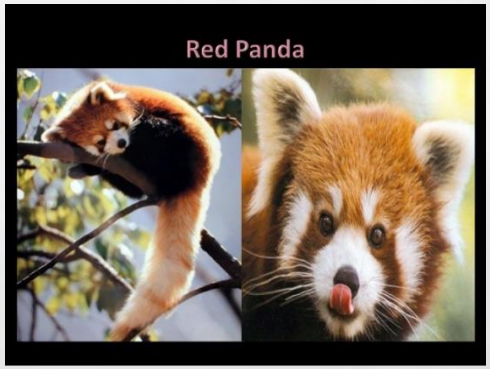


Secondary Causes

- Habitat loss
- Habitat degradation and fragmentation
- Introduction of nonnative species
- Pollution
- Commercial hunting and poaching
- Sale of exotic pets and decorative plants
- Overfishing
- Climate change
- Predator and pest control

ENDANGERED AND THREATENED SPECIES

- EVEN BIOLOGIST CLASSIFY SPECIES INTO TWO EXTINCTION
  - **ENDANGERED SPECIES:** FEW INDIVIDUALS ARE THERE AND THOSE SPECIES COULD BECOME EXTINCT. (NATURAL RANGE)



  - **THREATENED SPECIES:** (KNOWN AS VULNERABLE SPECIES) IS STILL ABUNDANT IN NATURAL RANGE, BUT DECLINE IN NUMBERS AND BECOME ENDANGERED IN NEAR FUTURE.

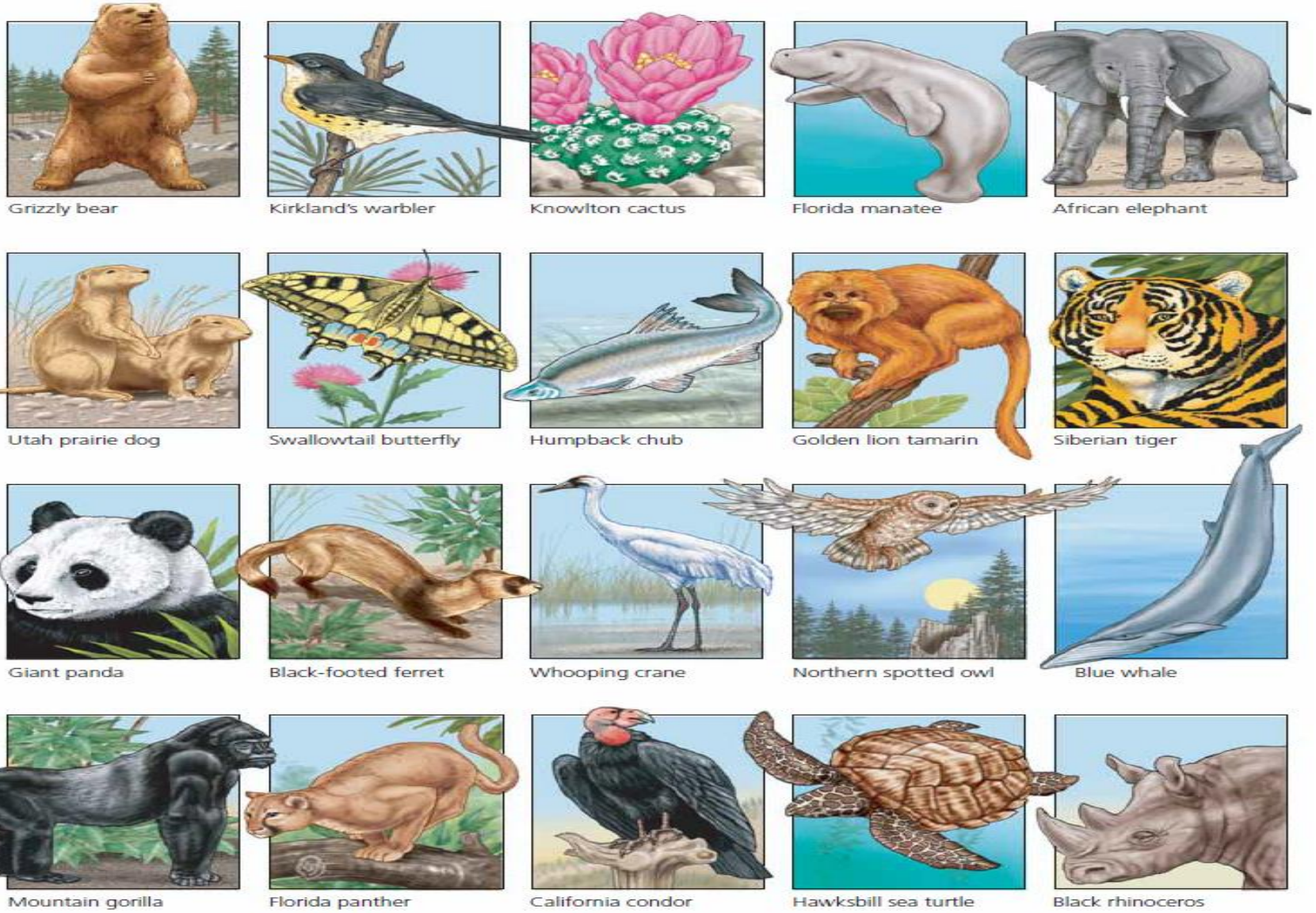


Figure 9-3 Endangered natural capital: species that are endangered or threatened with premature extinction largely because of human activities. Almost 30,000 of the world's species and 1,260 of those in the United States are officially listed as being in danger of becoming extinct. Most biologists believe the actual number of species at risk is much larger.

WAYS THAT SPECIES BECOME ENDANGERED

- HABITAT LOSS
- UNREGULATED OR ILLEGAL POACHING
- PESTICIDES
- POLLUTION
- COMPETITION WITH OTHER SPECIES
- DISEASE
- PREDATORS IN NATURAL

INVASIVE SPECIES- CASE STUDY

- **INTRODUCING THE EXOTIC SPECIES ALSO DISTURB THE ECOSYSTEM.**

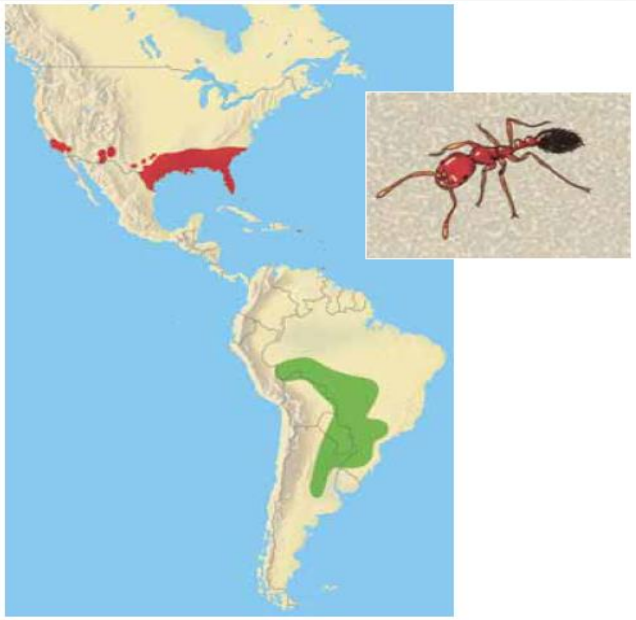


Figure 9-11 *Accidentally introduced invasive species:* the *Argentina fire ant,* introduced accidentally into Mobile, Alabama, in 1932 from South America (green area), has spread over much of the southern United States (red area). This invader is also found in Puerto Rico, New Mexico, and California. **Question:** How might this accidental introduction of fire ants have been prevented? (Data from S.D. Porter, Agricultural Research Service, U.S. Department of Agriculture)

- Aggressive argentina fire ant introduced

Into the United states.

- When these ant invade an area, they

wipe off 90% native species.

- They killed the deer fawns, birds, livestock

Pets, 80 % people was allergic to their venom.

WAYS TO REDUCE THREATS FROM INVASIVE SPECIES

- ONCE AN NON-NATIVE SPECIES IS ESTABLISHED IN AN ECOSYSTEM, ITS REMOVAL IS ALMOST IMPOSSIBLE.
- FUND A MASSIVE RESEARCH PROGRAM TO IDENTIFY THE SPECIES TO BECOME SUCCESSFUL INVADERS.
- INCREASE THE GROUND SURVEYS AND MONITOR THE SPECIES AND FIND HOW THEY WILL SPREAD.
- STEP UP FOR IMPORTED GOODS WHICH LIKELY CONTAIN THE INVADER SPECIES.
- IDENTIFY MAJOR HARMFUL INVADER SPECIES AND PASS INTERNATIONAL LAWS BANNING IN TRANSFER FROM ONE TO THE ANOTHER.
- INCREASE RESEARCH TO FIND NATURAL PREDATORS, BACTERIA, AND VIRUSES TO CONTROL THE POPULATION OF THE INVADER SPECIES.

RARE SPECIES

Protect those species from poaching

- THESE ARE SPECIES WITH SMALL POPULATION SIZE IN THE WORLD, DISTRIBUTED IN LOCALISED OR RESTRICTED AREA.

PREVENTING SPECIES TO EXTINCTION