A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A),

(Re- Accredited by NAAC with B Grade)

Jagannaickpur, Kakinada-533002, East Godavari, AP

DEPARTMENT OF ZOOLOGY & AQUACULTURE TECHNOLOGY

2022-2023

Bridge Course

(Zoology & Aquaculture Technology)

ASD GOVT. DEGREE COLLEGE FOR WOMEN (A)

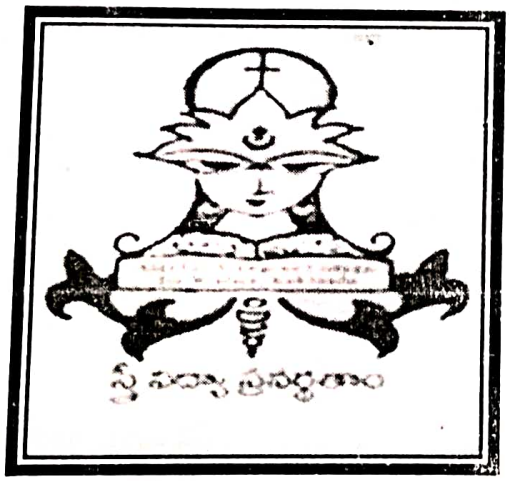
(Re- Accredited by NAAC with B Grade)
Jagannaickpur, Kakinada, East Godavari, AP – 533002

DEPARTMENT OF ZOOLOGY & AQUACULTURE TECHNOLOGY

ZOOLOGY

Bridge Course

(CBZ & CZAqT)



2022-2023

ASD GOVT DEGREE COLLEGE FOR WOMEN (A), KAKINADA

DEPARTMENT OF ZOOLOGY AND AQUACULTURE TECHNOLOGY

Bridge course 2022-2023

The Department of Zoology & Aquaculture Technology has conducted Bridge Course for Newly joined students of CBZ & CZAqT in the academic year 2021-2022. The course was conducted from 31/10/2022 to 11/11/2022.

Syllabus covered during the course:

- Basics in Zoology
- Scope and significance of Zoology
- Branches of Zoology Applied Zoology
- Recent trends in Zoology
- Role of Human beings in protecting environment and biodiversity.

57 students were benefited from this course. This course was intended to bridge the gap between the knowledge they gained in their Intermediate and the knowledge required to begin their UG studies. A pre-bridge course test was conducted before the commencement of course to test the knowledge levels of students and a post- bridge course test was conducted after the completion of the course to assess the achievement of course objectives.

Ms. M.Vasantha Lakshmi- HoD of Zoology, Ms. S.Madhavi- Lecturer in Zoology and Ms. N.Veera Chanti -Guest Faculty in Aquaculture Technology have conducted this course.

Signature of Lecturer in Charge

Lecturer-in-Charge
DEPARTMENT OF ZOOLOGY
A.S. GOVT. COLLEGE FOR WOMEN
KAKINADA-2

Signature of the Lecturers: 1.

2. S. Madhavi

Signature of the Principal

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Zoology – study of animals. Zoology, or "animal biology", is the branch of biology that relates to the animal kingdom, including the identification, structure, embryology, evolution, classification, habits, and distribution of all animals, both living and extinct, and how they interact with their ecosystems. The term is derived from Ancient Greek word ζῷον (*zōon*), i.e. "animal" and λόγος, (*logos*), i.e. "knowledge, study".[1] To study the variety of animals that exist (or have existed), see *list of animals by common name* and *lists of animals*.

Branches of zoology

- Acarology - study of mites and ticks
- Arthropodology - study of arthropods as a whole
  - Carcinology - the study of crustaceans
  - Myriapodology - study of milli- and centipedes
  - Arachnology - study of spiders and related animals such as scorpions, pseudoscorpions, and harvestmen, collectively called arachnids
  - Entomology - study of insects
    - Coleopterology - study of beetles
    - Lepidopterology - study of butterflies
    - Melittology - study of bees
    - Myrmecology - study of ants
    - Orthopterology - study of grasshoppers
- Herpetology - study of amphibians and reptiles
  - Batrachology - study of amphibians including frogs and toads, salamanders, newts, and caecilians
  - Cheloniology - study of turtles and tortoises
  - Saurology - study of lizards
  - Serpentology - study of snakes
- Ichthyology - study of fish
- Malacology - study of mollusks
  - Conchology - study of shells
  - Teuthology - study of cephalopods
- Mammalogy - study of mammals
  - Cetology - study of cetaceans
  - Primatology - study of primates
- Ornithology - study of birds
- Parasitology - study of parasites, their hosts, and the relationship between them
  - Helminthology - study of parasitic worms (helminths)
- Planktology - study of plankton, various small drifting plants, animals and microorganisms that inhabit bodies of water
- Protozoology - study of protozoan, the "animal-like" (i.e., motile and heterotrophic) protists
- Nematology - study of nematodes (roundworms)

By nature of studies

Anthrozoology - study of interaction between humans and other animals

Behavioral ecology - study of environmental effects on animal behaviors

- Endocrinology - study of endocrine systems
- Ethology - study of animal behaviour, usually with a focus on behaviour under natural conditions, and viewing behaviour as an evolutionarily adaptive trait
  - Neuroethology - study of animal behavior and its underlying mechanistic control by the nervous system
- Paleozoology - the branch of Paleontology that studies animal remains
- Zooarchaeology - study of animal remains in relation to ancient people
- Zoogeography - Zoogeography is the scientific study of geographical distribution of animal species (both historic and contemporary) in the world
- Zoography - Zoography is study of animals and their habitats (also known as descriptive zoology)
- Zoometry - is a sub-division of zoology that deals with measurements (length or size) of animal parts
- Zootomy - Human Anatomy is the study of the structure of humans and their various parts whereas Zootomy specifically refers to animal anatomy
- Zoomorphology - The morphology of animals
  - **General trends**
  - Zoology has become animal biology—that is, the life sciences display a new unity, one that is founded on the common basis of all life, on the gene pool–species organization of organisms, and on the obligatory interacting of the components of ecosystems. Even as regards the specialized features of animals—involving physiology, development, or behaviour—the current emphasis is on elucidating the broad biological principles that identify animals as one aspect of nature. Zoology has thus given up its exclusive emphasis on animals—an emphasis maintained from Aristotle's time well into the 19th century—in favour of a broader view of life. The successes in applying physical and chemical ideas and techniques to life processes have not only unified the life sciences but have also created bridges to other sciences in a way only dimly foreseen by earlier workers. The practical and theoretical consequences of this trend have just begun to be realized.
  - **Methods in zoology**
  - Because the study of animals may be concentrated on widely different topics, such as ecosystems and their constituent populations, organisms, cells, and chemical reactions, specific techniques are needed for each kind of investigation. The emphasis on the molecular basis of genetics, development, physiology, behaviour, and ecology has placed increasing importance on those techniques involving cells and their many components. Microscopy, therefore, is a necessary technique in zoology, as are certain physicochemical methods for isolating and characterizing molecules. Computer technology also has a special role in the analysis of animal life. These newer techniques are used in addition to the many classical ones—measurement and experimentation at the tissue, organ, organ system, and organismic levels.
  - **Microscopy**
  - In addition to continuous improvements in the techniques of staining cells, so that their components can be seen clearly, the light used in microscopy can now be manipulated to make visible certain structures in living cells that are otherwise

undetectable. The ability to observe living cells is an advantage of light microscopes over electron microscopes; the latter require the cells to be in an environment that kills them. The particular advantage of the electron microscope, however, is its great powers of magnification. Theoretically, it can resolve single atoms; in biology, however, magnifications of lesser magnitude are most useful in determining the nature of structures lying between whole cells and their constituent molecules.

- **Separation and purification techniques**
- The characterization of components of cellular systems is necessary for biochemical studies. The specific molecular composition of cellular organelles, for example, affects their shape and density (mass per unit volume); as a result, cellular components settle at different rates (and thus can be separated) when they are spun in a centrifuge.
- Other methods of purification rely on other physical properties. Molecules vary in their affinity for the positive or negative pole of an electrical field. Migration to or away from these poles, therefore, occurs at different rates for different molecules and allows their separation; the process is called electrophoresis. The separation of molecules by liquid solvents exploits the fact that the molecules differ in their solubility, and hence they migrate to various degrees as a solvent flows past them. This process, known as chromatography because of the colour used to identify the position of the migrating materials, yields samples of extraordinarily high purity.
- **Radioactive tracers**
- Radioactive compounds are especially useful in biochemical studies involving metabolic pathways of synthesis and degradation. Radioactive compounds are incorporated into cells in the same way as their nonradioactive counterparts. These compounds provide information on the sites of specific metabolic activities within cells and insights into the fates of these compounds in both organisms and the ecosystem.
- **Computers**
- Computers process information using their own general language, which is able to complete calculations as complex and diverse as statistical analyses and determinations of enzymatically controlled reaction rates. Computers with access to extensive data files can select information associated with a specific problem and display it to aid the researcher in formulating possible solutions. They help perform routine examinations such as scanning chromosome preparations in order to identify abnormalities in number or shape. Test organisms can be electronically monitored with computers, so that adjustments can be made during experiments; this procedure improves the quality of the data and allows experimental situations to be fully exploited. Computer simulation is important in analyzing complex problems; as many as 100 variables, for example, are involved in the management of salmon fisheries. Simulation makes possible the development of models that approach the complexities of conditions in nature, a procedure of great value in studying wildlife management and related ecological problems.
- **Applied zoology**
- Animal-related industries produce food (meats and dairy products), hides, furs, wool, organic fertilizers, and miscellaneous chemical byproducts. There has been a dramatic increase in the productivity of animal husbandry since the 1870s, largely as a consequence of selective breeding and improved animal nutrition. The purpose of selective breeding is to develop livestock whose desirable traits have strong heritable components and can therefore be propagated. Heritable components are distinguished

from environmental factors by determining the coefficient of heritability, which is defined as the ratio of variance in a gene-controlled character to total variance.

- Another aspect of food production is the control of pests. The serious side effects of some chemical pesticides make extremely important the development of effective and safe control mechanisms. Animal food resources include commercial fishing. The development of shellfish resources and fisheries management (*e.g.*, growth of fish in rice paddies in Asia) are important aspects of this industry.

Biodiversity or **biological diversity** is the variety and variability of life on Earth. Biodiversity is a measure of variation at the genetic (*genetic variability*), species (*species diversity*), and ecosystem (*ecosystem diversity*) level. The age of the Earth is about 4.54 billion years. The earliest undisputed evidence of life dates at least from 3.7 billion years ago, during the Eoarchean era after a geological crust started to solidify following the earlier molten Hadean eon. There are microbial mat fossils found in 3.48 billion-year-old sandstone discovered in Western Australia. Other early physical evidence of a biogenic substance is graphite in 3.7 billion-year-old meta-sedimentary rocks discovered in Western Greenland. More recently, in 2015, "remains of biotic life" were found in 4.1 billion-year-old rocks in Western Australia. According to one of the researchers, "If life arose relatively quickly on Earth...then it could be common in the universe.

"Biodiversity" is most commonly used to replace the more clearly-defined and long-established terms, species diversity and species richness.[13] Biologists most often define biodiversity as the "totality of genes, species and ecosystems of a region".[14][15] An advantage of this definition is that it presents a unified view of the traditional types of biological variety previously identified:

- taxonomic diversity (usually measured at the species diversity level)[16]
- ecological diversity (often viewed from the perspective of ecosystem diversity)[16]
- morphological diversity (which stems from genetic diversity and molecular diversity[17])
- functional diversity (which is a measure of the number of functionally disparate species within a population (e.g. different feeding mechanism, different motility, predator vs prey, etc.)[18]) This multilevel construct is consistent with Datman and Lovejoy

Forest biological biodiversity[edit]

Forest biological diversity is a broad term that refers to all life forms found within forested areas and the ecological roles they perform. As such, forest biological diversity encompasses not just trees, but the multitude of plants, animals and microorganisms that inhabit forest areas and their associated genetic diversity. Forest biological diversity can be considered at different levels, including ecosystem, landscape, species, population and genetic. Complex interactions can occur within and between these levels. In biologically diverse forests, this complexity allows organisms to adapt to continually changing environmental conditions and to maintain ecosystem functions.

Biolinguistic diversity

Biolinguistic diversity comprises the expanse of all living things on earth, including all humans and the languages that they speak

Biodiversity Hotspot

A biodiversity hotspot is a region with a high level of endemic species that have experienced great habitat loss.[47] The term hotspot was introduced in 1988 by Norman Myers.[48][49][50][51] While hotspots are spread all over the world, the majority are forest areas and most are located in the tropics.

Brazil's Atlantic Forest is considered one such hotspot, containing roughly 20,000 plant species, 1,350 vertebrates and millions of insects, about half of which occur nowhere else.[52][53] The island of Madagascar and India are also particularly notable

Role of an individual in conservation of natural resources –

Conservation of energy:

1. Switch off light, fan and other appliances when not in use.
2. Use solar system heater for cooking.
3. Dry the cloth in the sunlight instead of driers.
4. Use always pressure cookers.

Conservation of water:

1. Use minimum water for all domestic purposes.
2. Use drip irrigation.
3. A rainwater harvesting system should be installed in all the houses.
4. Sewage treatment plants may be installed in all industries and institutions.

Conservation of soil:

1. Grow different types of plants i.e. trees, herbs, and shrubs.
2. In the irrigation process, using a strong flow of water should be avoided.

Conservation of forest:

1. Use non-timber products.
2. Plant more trees.
3. Minimize the use of paper and fuel.
4. Avoid the construction of dam, road in the forest areas.

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

Department of Zoology and Aquaculture Technology

Bridge course questionnaire

1. In Greek "Zoo" means ( )

A) Animal B) Ant C) Plant D) Life

2. Branch of Zoology that deals with classification of animals ( )

A) Anatomy B) Taxonomy C) Morphology D) Ecology

3. Who is the father of Zoology? ( )

A) Aristotle B) Goldfuss C) Haeckel D) Linnaeus

4. Group of cells performing same function is called ( )

A) Tissue B) Organ C) System D) Metabolism

5. Largest class among Animalia ( )

A) Sarcodina B) Insecta C) Gastropoda D) Astroidea

6. Bat is a ( )

A) Bird B) Mammal C) Dragon D) Fox

7. The cell organelle that helps in amoeboid movement ( )

A) Cilia B) Pseudopodium C) Flagella D) Myonemes

8. Primitive life is in the form of ( )

A) Prokaryotes B) Protobiont C) Eukaryotes D) Autotrophic

9. Apiculture is culturing of ( )

A) Fishes B) Birds C) Bees D) Apple

10. Father of Genetics ( )

A) Gregor John Mendel B) Hugo devries C) Bateson D) Morghan

11. The number of Biodiversity hotspots in the world ( )

A) 17 B) 26 C) 36 D) 42

12. The term biodiversity hotspot was introduced by ( )

A). Bateson B). Norman Mayer C). Linnaeus D). Robert Hooke

13. Study of birds is called as ( )

A).Entomology B).Ornithology C). Saurology D). Ichthyology

14. Distribution of variable number of species on biosphere is called ( )

A). Biodiversity B). Ethology C).Geography D). Zoogeography

15. Study of Cancer is called as ( )

A). Radiology B).Carcinology C). Oncology D). Conchology

16. Global warming is due to which gas ( )

A). O_2 B). H_2 C). CO_2 D) O3

17. Find the the radio active elememt among the following ( )

A).C14 B).H1 C). N14 D) O16

18. Seperation of molecules in an electrical field. ( )

A).Purification B). Centrifugation C).Electrophoresis D) Blotting

19. The simple microscope was invited by ( )

A).Robert Brown B).Robert Hooke C).Linnaeus D) Darwin

20. Environmental protection act was enacted in the year ( )

A). 1985 B).1986 C).1987 D).1988

Key: 1).A, 2)B, 3).A, 4).A, 5).B, 6) B, 7).B, 8).B. 9).C, 10).A, 11).C, 12)B, 13).B, 14)A, 15).C, 16)C, 17).A, 18).C, 19).B, 20).B

Bridge course attendance 2022-2023

S.No	Name of Student	31/10/2022	01/11/2022	02/11/2022	03/11/2022	4/11/2022	05/11/2022	08/11/2022	09/11/2022	10/11/2022	11/11/2022	Signature
1	T. Divya	P	P	A	P	P	P	P	P	P	P	T. Divya
2	M. Satya Veni	A	P	P	P	P	P	P	A	P	A	M. Satya Veni
3	P.S.S Srivalli	P	P	A	P	P	P	P	P	P	P	P.S.S.Srivalli
4	Ch. Srilakshmi Durga Divya	P	P	P	P	P	P	P	P	A	P	Ch.S.L.D.Divya
5	K. Kaveri	P	P	P	P	P	P	P	P	A	P	K. Kaveri
6	A. Akhila	P	P	P	P	A	P	P	P	A	A	A. Akhila
7	M.Mounika	P	P	A	P	P	P	P	P	A	P	P. Leela Sadguru
8	P. Leela sadguru	P	P	P	P	P	P	P	P	P	P	M. mounika
9	A.Ganga Bhavani	P	P	A	P	P	P	P	P	P	A	A. Ganga Bhavani
10	M. Chadrika	P	P	P	P	P	P	P	P	P	P	M Chandrika
11	P.Rajya Lakshmi	P	P	A	P	P	P	P	P	P	A	P. Rajya lakshmi
12	Y. Sri Sai Durga	A	P	P	P	A	A	A	P	A	P	Y. Sri Sai Durga
13	N. Yamuna	A	P	P	P	A	A	P	A	P	P	N. Yamuna
14	Ch.Bhoomika	P	P	A	A	A	A	A	A	A	A	ch. Bhoomika
15	B.Durga Bhavani	P	A	P	P	A	A	A	P	A	A	B. Durga Bhavani
16	P.Gayathri	P	A	P	P	P	P	P	P	P	P	P. [illegible]
17	V. Muneswari	A	P	P	P	P	P	A	A	P	P	V. Muneswari
18	K.Bala Ranjani	A	P	P	P	P	P	P	P	P	P	K. Bala Ranjani
19	V.Sudha Rani	P	P	A	P	P	P	P	P	P	P	V. Sudha
20	K.Lakshmi Pallavi	P	P	P	P	P	P	P	P		P	K. Laxmi pallavi
21	P.Hema Latha	P	P	P	A	A	A	P	P	P	P	P. Hema latha
22	S.Sharon	P	P	P	A	A	A	P	P	P	P	S. Sharon
23	Ch. Srivalli	P	P	P	A	P	P	P	P	P	P	Ch. Srivalli
24	P.Bhuneswari	P	P	P	P	P	P	P	P	P	P	P. Bhuvaneswari
25	Ch. Anitha Raj	P	A	P	P	P	P	P	A	P	A	Anitha

Pre and Post Bridge Course Test Marks

S.No	Name of Student	Pre-Bridge course test marks	Post- Bridge course test marks
1	T. Divya	10	15
2	M. Satya Veni	12	16
3	P.S.S Srivalli	08	13
4	Ch. Srilakshmi Durga Divya	13	16
5	K. Kaveri	06	16
6	A. Akhila	08	15
7	M.Mounika	13	16
8	P. Leela sadguru	09	13
9	A.Ganga Bhavani	09	16
10	M. Chadrika	12	16
11	P.Rajya Lakshmi	09	12
12	Y. Sri Sai Durga	08	12
13	N. Yamuna	12	16
14	Ch.Bhoomika	11	17
15	B.Durga Bhavani	A	A
16	P.Gayathri	A	A
17	V. Muneswari	07	16
18	K.Bala Ranjani	13	15
19	V.Sudha Rani	05	14
20	K.Lakshmi Pallavi	06	14
21	P.Hema Latha	06	14
22	S.Sharon	09	14
23	Ch. Srivalli	14	15
24	P.Bhuneswari	11	16
25	Ch. Anitha Raj		

Signature of the Lecturer-in-charge

DEPARTMENT OF ZOOLOGY
G.S. GOVT. COLLEGE FOR WOMEN
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DEPARTMENT OF ZOOLOGY & AQUACULTURE TECHNOLOGY

AQUACULTURE TECHNOLOGY

Bridge Course

(CZAqT)

2022-2023

ASD GOVT DEGREE COLLEGE FOR WOMEN (A), KAKINADA

DEPARTMENT OF ZOOLOGY AND AQUACULTURE TECHNOLOGY

Bridge course 2022-2023

The Department of Zoology & Aquaculture Technology has conducted Bridge Course for Newly joined students of CZAqT in the academic year 2022-2023. The course was conducted from 31/10/2022 to 11/11/2022.

Syllabus covered during the course:

- Fisheries and Aquaculture Introduction
- Types of aquaculture
- Benefits of aquaculture
- Importance of Aquaculture

19 students were benefited from this course. This course was intended to bridge the gap between the knowledge they gained in their Intermediate and the knowledge required to begin their UG studies. A pre-bridge course test was conducted before the commencement of course to test the knowledge levels of students and a post- bridge course test was conducted after the completion of the course to assess the achievement of course objectives.

Ms. M.Vasantha Lakshmi- HoD of Zoology, Ms. S.Madhavi- Lecturer in Zoology and Ms. N.Veera Chanti -Guest Faculty in Aquaculture Technology have conducted this course.

Signature of Lecturer in Zoology

HEAD OF THE DEPARTMENT OF ZOOLOGY
A.S.D. GOVT. COLLEGE FOR WOMEN
KAKINADA-2

Signature of the Lecturers: 1. N. Veera Chanti

Signature of the Principal

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Fisheries and Aquaculture

About Indian Fisheries India is the third largest fish producing country and the second largest aquaculture fish producer in the world. India contributes about 7% to the global fish production. The country is also home to more than 10% of the global fish biodiversity and is one of the 17-mega biodiversity rich countries. Around 14 million people are engaged in fisheries and its allied activities. Andhra Pradesh is the largest fish producer in the country followed by West Bengal and Gujarat. The total fish production during 2017-18 is estimated to be 12.60 million metric tonnes, of which nearly 70% is from inland sector and about 50% of the total production is from culture fisheries. More than 50 different types of fish and shellfish products are being exported to 75 countries around the world. Fish and fish products have presently emerged as the largest group in agricultural exports from India, with 13.77 lakh tonnes in terms of quantity and Rs. 45,106.89 crore in value. This accounts for around 10% of the total exports and nearly 20% of the agricultural exports, and contribute to about 0.91% of the GDP and 5.23% to the Agricultural GVA of the country.

Fisheries is an economic activity that involves harvesting fish or any aquatic organism from the wild (Capture Fisheries) or raising them in confinement (Culture Fisheries/ Aquaculture). It may be Traditional/ Small Scale Fisheries (SSF) for sustenance, or Large-Scale/ Commercial Fisheries for profit.

Fish (in general) is a cold-blooded aquatic organism that breathes with gills and swims with fins; they are categorized as Finfish and Shellfish.

Finfish are cold-blooded aquatic vertebrates that have gills, fins with rays, and scales covering the body.

Shellfish are cold-blooded aquatic invertebrate that have gills, various types of locomotory organs and a shell/ exoskeleton covering the body. They include crustaceans and mollusc.

Biodiversity: India has a large number of finfish species. As per the database of the National Bureau of Fish Genetic Resources (NBFGR), Lucknow, 2,508 species of native finfish have been recorded, of which 1,518 species are from the marine environment, 113 from brackish waters and 877 are from freshwater habitats. In addition, 291 exotic fish species also occur in India.

Fish Diversity of India* Native Fishes Number of Species Marine Ecosystem 1518 Brackishwater Ecosystem 113 Freshwater Ecosystem 877 Sub-total 2508 Exotic Fishes 291 Total 2799 *Uttam K Sarkar, JK Jena, Shri Prakash Singh, AK Singh and SC Rebello (2012). Documenting Coastal Fish Biodiversity of India: Status, Issues and Challenges. Conference Paper, International Day for Biological Diversity, Marine Biodiversity, 22 May 2012, Uttar Pradesh State Biodiversity Board, Lucknow, pp. 22-28.

Categorization of Fish by their habitat:

- **Freshwater Fish:** Fish that spend most or all of their life in freshwaters, such as rivers and lakes, having a salinity of less than 0.5 ppt. Around 40% of all known species of fish are found in freshwater. They may be divided into Coldwater Fish (5 – 20 oC); examples: Mahseer, Trout, etc., and Warm water Fish (25 – 35 oC); example: Carps, Catfish, Snakeheads, Feather backs, etc.
- **Brackish water Fish:** Fish that can tolerate a wide range of salinity (0.5 – 30.0 ppt) and live in backwaters, estuaries and coastal waters. Example: Mullet, Milkfish, Seabass, Pearlspot, Mudskipper, etc.

• **Marine Fish:** Fish that spend most or all of their life in seawater, such as Seas and Oceans, having salinity above 30 ppt. There are about 240 species contributing to the marine fisheries. Example: Sardines, Mackerel, Ribbonfish, Anchovies, Grouper, Cobia, Tuna, etc

Definition of Aquaculture

Aquaculture: The farming of aquatic organisms including fish, molluscs, crustaceans and aquatic plants. Farming implies some sort of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated, the planning,

development and operation of aquaculture systems, sites, facilities and practices, and the production and transport.
For more terms related to aquaculture,

Types of Aquaculture

There are different types of aquaculture –
I. Depending on Hydrobiological Features
II. Depending on the Motive of Farming
III. Depending on Special Operational Techniques
Various types of cultural practices are carried out in each of these divisions. Some have been discussed here.

1. Mariculture

Mariculture is aquaculture that involves the use of seawater. It can either be done next to an ocean, with a sectioned off part of the ocean or in ponds separate from the ocean, but containing seawater all the same. The organisms bred here range from molluscs to seafood options like prawn and other shellfish, and even seaweed.
Growing plants like seaweed are also part of mariculture. These sea plant and animal species find many uses in manufacturing industries such as in cosmetics and jewelry where collagen from seaweed is used to make facial creams. Pearls are picked from molluscs and made into fashion items.

2. Fish Farming

Fish farming is the most common type of aquaculture. It involves the selective breeding of fish, either in freshwater or seawater, with the purpose of producing a food source for consumption. Fish farming is highly exploited as it allows for the production of a cheap source of protein.
Furthermore, fish farming is easier to do than other kinds of farming as fish are not care-intensive, but only requiring food and proper water conditions as well as temperatures. The process is also less land-intensive as the size of ponds required to grow some fish species such as tilapia is much smaller than the space required to grow the same amount of protein from beef cattle.

3. Algaculture

Algaculture is a type of aquaculture involving the cultivation of algae. Algae are microbial organisms that share animal and plant characteristics. They are sometimes motile like other microbes, but they also contain chloroplasts that make them green and allow them to photosynthesize just like green plants.
However, for economic feasibility, they have to be grown and harvested in large numbers. Algae are finding many applications in today's markets. Exxon mobile has been making strides in developing them as a new

4. Integrated Multi-Trophic Aquaculture(IMTA)

IMTA is an advanced system of aquaculture where different trophic levels are mixed into the system to provide different nutritional needs for each other. Notably, it is an efficient system because it tries to emulate the ecological system that exists in the natural habitat.

The IMTA makes use of these intertropical transfer of resources to ensure maximum resource utilization by using the waste of larger organisms as food sources for the smaller ones. The practice ensures the nutrients are recycled, meaning the process is less wasteful and produces more products.

5. Inland Pond Culture

This usually involves inland artificial ponds of about 20 acres in size and about 6-8ft deep. It is common to see aeration systems connected to the pond, to introduce air into the ponds. This enhances the supply of oxygen and also reduces ice formation in the winter season.
In China, over 75% of the farmed freshwater fish are produced in constructed ponds, and nearly all of the farmed catfish are raised in ponds in the U.S.

6. Recirculating Systems

This involves a closed set of chambers (units) where fish is kept in one and water treatment kept in another. It is highly dependent on the power supply, as water has to be pumped constantly through the fish chambers. As water flows through the treatment chamber, particulate matter is filtered out and air introduced. This closed system controls the salinity, temperature, oxygen and anything that can cause harm to the fish.
It is an environmentally friendly system because very little new water is introduced to replace water that evaporated. The residue from the filters is also disposed of in a responsible manner.

7. Open-net pen and Cage Systems

Open-net pen and Cage systems are often found offshore and in freshwater lakes. Mesh cages of between 6 and 60 cubic feet (pens) are installed in the water with the fish inside it. With a high concentration of fish in the pens, waste, chemicals, parasites and diseases are often exchanged in the immediate water environments.
The fish also attract predatory animals (bigger fish), which are often entangled in the nets. This system uses public water; therefore, environmental regulation and some authorization protocols must be respected.

8. Flow-through / Raceway

This is a system made of long units stocked with fish. The units have feeding stations attached to them. Water is diverted from flowing water and fed into the raceway units flowing downstream. Down the end of the unit, waste is collected and disposed of. Raceways are common for culturing trout.

Benefits of Aquaculture

Economic Benefits

1. Alternative Food Source

Fish and other seafood are good sources of protein. They also have more nutritional value like the addition of natural oils into the diet, such as omega 3 fatty acids. Also, since it offers white meat, it is better for the blood to reduce cholesterol levels as opposed to beef's red meat.
Fish is also easier to keep compared to other meat-producing animals as they are able to convert more feed into protein. Therefore, its overall conversion of a pound of food to a pound of protein makes it cheaper to rear fish as they use the food more efficiently.

2. Alternative Fuel Source

Algae are slowly being developed into alternative fuel sources by having them produce fuels that can replace contemporary fossil fuels. Algae produce lipids that, if harvested, can be burned as an alternative fuel source whose only by-products would be water when burnt.

Such a breakthrough could ease the dependency of the world on drilled fossil fuels as well as reduce the price of energy by having it grown instead of drilling petroleum. Moreover, algae fuel is a cleaner and farmable source of energy, which means it can revolutionize the energy sector and create a more stable economy that avoids the boom-bust nature of oil and replaces it with a more abundant fuel source.

3. Increase Jobs in the Market

Aquaculture increases the number of possible jobs in the market. It provides both new products for a market and creates job opportunities as labor is required to maintain the pools and harvest the organisms grown.

The increase in jobs is mostly realized in third world countries as aquaculture provides both a food source and an extra source of income to supplement those who live in these regions.

Aquaculture also saves fishermen time as they do not have to spend their days at sea fishing. It allows them free time to pursue other economic activities like engaging in alternative businesses. This boosts entrepreneurship and provides more hiring possibilities and more jobs.

4. Reduce Sea Food Trade Deficit

The seafood trade in America is mainly based on trade from Asia and Europe, with most of it being imported. The resultant balance places a trade deficit on the nation. Aquaculture would provide a means for the reduction of this deficit at a lower opportunity cost as local production would mean that the seafood would be fresher. It would also be cheaper due to reduced transport costs.

Environmental Benefits

1. Creates a Barrier Against Pollution With Mollusc and Seaweed

Molluses are filter feeders, while seaweed acts a lot like the grass of the sea. Both these organisms sift the water that flows through them as brought in by the current and clean the water. This provides a buffer region that protects the rest of the sea from pollution from the land, specifically from activities that disturb the sea bed and raise dust.

Also, the economic benefits of molluses and seaweed can create more pressure from governments to protect their habitats as they serve economic importance. The financial benefits realized provides an incentive for the government to protect the seas in order to protect seafood revenue.

2. Reduces Fishing Pressure on Wild Stock

The practice of aquaculture allows for alternative sources of food instead of fishing the same species in their natural habitats. Population numbers of some wild stocks of some species are in danger of being depleted due to overfishing and uncontrolled exploitation. The use of unsustainable fishing methods such as bottom trawlers is also reduced.

Aquaculture provides an alternative by allowing farmers to breed those same species in captivity and allow the wild populations to revitalize. The incentive of less labor for more gains pushes fishers to convert to fish farmers and make even more profit than before.

It also allows the control of the supply of the fish in the market, giving them the ability to create surplus stock or reduce their production to reap the best profits available.

3. Low Environmental Impact

Studies conducted by NOAA indicate aquaculture poses a low risk to the environment. The impact is mostly local and temporary. In some cases, aquaculture can benefit the

environment. Where filter-feeding shellfish, such as oysters, are cultured in-situ, water quality in ponds and lakes can improve.

Fish and shellfish can also be farmed using methods that do not harm the environment, and that helps meets the growing demand for seafood by supplementing wild harvests. Especially for offshore systems, the bio-security systems, cameras and surveillance infrastructure, as well as trained inspectors, ensure that farms are complying with environmentally safe practices. This helps to reduce diseases transfer in the waters and so on.

4. Water Usage

Aquaculture systems often take advantage of harvested runoffs, stormwater and surface water. This reduces the dependency on other sources of water supply. In addition to this, ponds maintain soil moisture in their vicinity, thereby conserving natural resources.

Importance of Aquaculture

1. Health Benefit

All over the world, the demand for seafood has increased because people have learned that seafood are healthier and help fight cardiovascular disease, cancer, alzheimer's and many other major illnesses. Now seafood has become part of regular diets.

2. Sustainable Use of Sea Resources

Aquaculture provides alternatives for fishing from the sea. An increase in demand for food sources and globalization has led to an increase in fishing. Aquaculture is currently estimated to account for approximately 13 percent (10.2 million tons) of world fish production.

Yet, this has led fishermen to become selfish and overfish the desired or high-demand species. Through aquaculture, it provides both an alternative and opportunity for wild stocks to replenish over time.

3. Conservation of Biodiversity

Aquacultures also protect biodiversity by reducing the fishing activities on the wild stock in their ecosystems. By providing alternatives to fishing, there is a reduced attack on the wild populations of the various species in the sea. Reduced action of fishing saves the diversity of the aquatic ecosystem from extinction due to overfishing.

4. Increased Efficiency, More Resources for Less Effort

Fish convert feed into body protein more efficiently than cattle or chicken production. It is much more efficient, meaning that the fish companies make more food for less feed.

Such efficiency means that less food and energy is used to produce food, meaning that the production process is cheaper as well. It saves resources and even allows for more food to be produced, leading to secure reserves and less stress on the environment.

Aquacultures will add to wild seafood and make it cheaper and accessible to all, especially in regions where they depend on imported seafood products.

5. Reduced Environmental Disturbance

By increasing aquaculture, fish farming in specific, there is a reduced need for the fishing of the wild stock. As an outcome, it puts less stress on the ecosystem and equally reduces human interference.

Actions of motorboats and other human influences such as the removal of viable breeding adult fish are all stresses put on the aquatic ecosystems, and their discontinuation allows the ecosystem to flourish and find their natural balance.

Freshwater aquaculture refers to raising and breeding aquatic animals (fish, shrimp, crab, shellfish, etc.) and plants for economic purposes by the use of ponds, reservoirs, lakes, rivers, and other inland waterways (including brackish water), which play an important role in the aquaculture industry.

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

Department of Zoology and Aquaculture Technology

Bridge course questionnaire

1. Study of Fishes is called as ( )

A) Ichthyology B) Herpetology C) Zoology D) Physiology

2. Culturing of Fishes is called as ( )

A) Aquaculture B) Pisciculture C) Sericulture D) Apiculture

3. Culturing of Aquatic organisms? ( )

A) Aquaculture B) Pisciculture C) Sericulture D) Apiculture

4. Shell fish belongs to which phylum ( )

A) Chordata & Arthropoda B) Annelida & Arthropoda
C) Echinodermata & Mollusca D) Arthropoda & Mollusca

5. Blue revolution is increase the production of ( )

A) Milk B) Fish C) Eggs D) Aquatic organisms

6. Largest fish ( )

A) Rhinodon B) Scoliodon C) Blue Whale D) Torpedo

7. Based on salinity water bodies are divided into ( )

A) 3 types B) 2 types C) 5 types D) 4 types

8. Fishes are ( )

A) Poikilothermic B) Homoeothermic C) Cold blooded D) A&C

9. Heart in fishes ( )

A) Bronchial B) Venous C) Two chambered D) All of the above

10. Respiratory organs in fishes ( )

A) Gills B) Lungs C) Both D) None

11. Fish fat is rich in ( )

A) N-3 Fatty Acids B) Cholesterol C) Saturated fatty acids D) None

12. Air bladder is present in ( )

A). Cartilaginous fish B). Bony fish C). Ornamental fish D). Shell fish

13. Which of the following is called as dermal denticle ( )

A).Placoid scale B).Cycloid Scale C). Ganoid scale D). Ctenoid Scale

14. Distribution of variable number of species on biosphere is called ( )

A). Biodiversity B). Ethology C).Geography D). Zoogeography

15. Catla catla is a ( )

A). Surface feeder B).Column feeder C). Bottom feeder D). All the above

16. Which of the following is air breething fish ( )

A). Catla B). Labeo C). Channa D) Grass Carp

17. Optimum DO in culture ponds ( )

A).5ppm B).8ppm C). 7ppm D) 9ppm

18. Turbidity is meassured by. ( )

A).Salinometer B). Secchi disc C).potentiometer D)Lactometer

19. Diseased fish is kept in ( )

A).Aquarium B).Culture pond C).Quarantine D) Hatchery

20. Widely cultured prawn at present ( )

A). Macrobrachium B).Paneaus Monodon C). Paneaus Indicus D) .L. Paneaus Vannamei

Key: 1).A, 2)B, 3).A, 4).A, 5).B, 6) C, 7).A, 8).D, 9).D, 10).A, 11).C, 12)B, 13).A, 14)A, 15).A, 16)C, 17).A, 18).B, 19).C, 20).D

Bridge course attendance 2022-2023

S. No	Name of Student	31/10/2022	01/11/2022	2/11/2022	3/11/2022	4/11/2022	5/11/2022	07/11/2022	08/11/2022	09/11/2022	10/11/2022	11/11/2022	Signature
1	Ch. Anitha Raj	A	P	P	P	P	P	P	P	P	P	A	Anf
2	V. Muneswari	P	P	P	P	P	P	P	P	P	P	P	V. Muneeswari
3	K. Bala Ranjani	P	P	P	P	P	P	P	P	P	P	P	K. Bala Ranjini
4	V. Sudha Rani	P	A	A	A	P	P	P	P	P	P	P	V. Sudha
5	Ch. Srivalli	P	P	P	P	P	P	P	P	P	P	P	Ch. Srivalli
6	P. Bhuvaneswari	P	P	P	P	P	P	P	P	P	P	P	P. Bhuvaneswari
7	P. Hema Latha	P	P	P	P	P	P	P	P	P	P	A	P. Hema latha
8	S. Sharon	P	P	P	P	P	P	P	P	P	P	P	S. Sharon
9	R. Prameela	A	A	A	A	A	A	A	A	P	P	P	R. Prameela
10	Ch. Pushpa	A	P	P	P	P	A	A	A	A	P	P	Ch. Pushpa
11	K. Aswini	A	P	P	P	P	P	P	P	P	P	P	K. Aswini
12	R.Deevana Kumari	A	A	A	A	A	A	A	P	P	P	P	R. Dkumari
13	V. Katyayini	A	A	A	A	A	A	A	A	A	P	P	V. Kalyayini

Pre and Post Bridge Course Test Marks

S.No	Name of Student	Pre-Bridge course test marks	Post- Bridge course test marks
1	Ch. Anitha Raj	10	Ab
2	V. Muneswari	Ab	14
3	K. Bala Ranjani	10	16
4	V. Sudha Rani	05	11
5	Ch. Srivalli	11	17
6	P. Bhuvaneswari	08	16
7	P. Hema Latha	12	Ab
8	S. Sharon	13	15
9	R. Prameela	Ab	Ab
10	Ch. Pushpa	10	15
11	K. Aswini	11	14
12	R.Deevana Kumari	11	15
13	V. Katyayini	08	14

Signature of the Lecturer in – charge

Lecturer-In-Charge
DEPARTMENT OF ZOOLOGY
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