

Facilities for aquaculture
FISH5630/6630

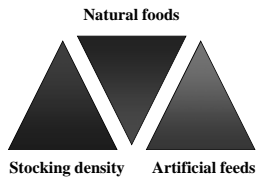
Class: T, TH 11:00-12:15
Laboratory: M 1-4

D. Allen Davis, Ph.D.
&
Guest Speakers



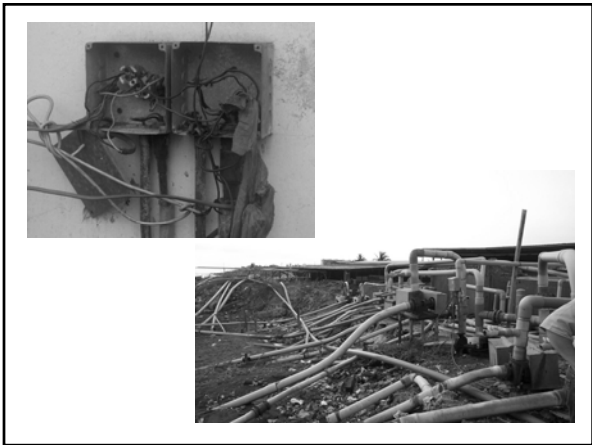
Aquaculture consists of a continuum of culture techniques and systems.

Systems range in complexity from natural ecosystem to automated recirculation systems.









- The objectives of this class are
 - To introduce you to the potential of various systems
 - Introduce you to engineering and maintenance concepts
 - Point out management and engineering requirements

Success of any operation depends on numerous factors:

- Infrastructure inputs
 - Engineering concepts and designs
 - Conceptual design, engineering specifics (water, electric, culture systems etc).
 - It is hard to over plan but it is easy to over engineer
 - Keep it simple
 - Keep it easy to maintain
 - Keep it low cost with respect to return on investment
 - I have yet to see any “new” technologies. I have seen numerous facilities who build fences to keep people and ideas out.




- Site limitations
 - Land topography and soils
 - Quantity and quality of the water
 - Infrastructure (do you have electricity?)
 - People (hard working, lazy, rural workforce?)
 - Processing resources (can you contract it out?)
 - Markets (Size, distance, price?)



- Management limitations
 - People and management style
 - Require proactive management
 - Not reactionary disaster control
 - Most aquaculture is rural
 - Is there a work force
 - Are they reliable?
 - Is security needed?





- Prepared feeds
 - Available
 - Economical
 - Consistent in quality
 - Produce good growth and survival
- Execution of a suitable business model
 - What are the assumptions?
 - If you lose your crop can you survive?
 - Were your assumption realistic (most are not)?
 - Feed costs, survival, growth rates etc

Aquaculture is not for everyone

- Aquaculture is more dependent on expert management and precise activity than other forms of farming.
 - If you are a good manager you will do well if you are not you will fail.
- If you do not have a realistic plan, a suitable site for your species and a good market you will not have a realistic chance to make money.

Aquaculture and food

- Populations and seafood consumption is increasing where as world capture fisheries production is flat.
- Aquaculture is the most realistic way to increase the availability of seafood.
- Best way to produce a product in which contaminants are controlled (good or bad)
- Aquaculture will not be successful if you are only trying to feed your family, if you do not make money it will not be sustained.

Types of aquaculture



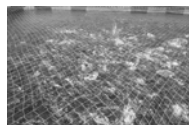
- Raceway systems
 - Single pass
 - Requires a lot of water (200,000 Liter/kg production)
 - Need to maintain temperature, DO and waste products at suitable levels for the culture animal
 - Multi-pass
 - Requires less water
 - Re-circulates by increasing DO. Limited by temperature and waste products.
 - Require relatively little land, can be built in mountainous areas require a lot of water.

Types of aquaculture



- Ponds
 - Extensive – no aeration
 - Semi-intensive – emergency aeration
 - Intensive – routine aeration
 - 6,000 lbs/acre with 100 lbs/day feed (10,000 lb/acre)
- Characteristics
 - Build in clay soils or using expensive liners
 - Large areas of land that are reasonably flat
 - Open to the atmosphere (no control)
 - Require a lot of water but you do not need to exchange water. 20,000 – 3,000 Liters/kg

Types of aquaculture



- Net cages
 - HDLV- high density low volume
 - Large volume – “lower” density systems
 - Salmon
 - Tuna
 - Ling
 - Tilapia



Types of aquaculture



- Recirculating Aquaculture Systems
 - Very intensive highly controlled systems
 - Energy intensive but use limited amounts of land and water (100 liters/kg)
 - Closed or partially isolated from the environment.
 - Common for marine maturation and nursery systems.
 - All commercial marine aquaria

Common characteristics

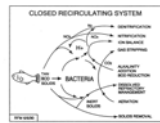


Figure 1. Diagram of fish wastes and their effects on bacterial and chemical components in a recirculating system.

- All system rely on water to
 - Transport oxygen to the animal
 - Carry away and process metabolic by-products
- If the design is not suitable:
 - The cost will be excessive
 - Grow and survival will be poor
- Aquaculture is a business, therefore you must know your market and be able to sell.
