Getting Started in Aquaculture

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6 Critical rules for success

1. Keep the fish wet
2. Big fish eat little fish
3. Critical components need 3 levels of redundancy
4. You can’t make money growing fish
5. Most operations fail because of poor business planning
6. Don’t make the same same mistake twice
“I have this pond…”

- Can I make money with it?
- What can I grow?
- What is it going to cost me?
- How hard do I have to work?
- Are there any subsidies?
- What do you mean it’s not my pond!
Goals- A fork in the road

• Profit
• Feed the family
• Agricultural experience for kids
• Landscape improvement
• Recreation
Write it down!

Ron’s Rule
If it doesn’t work on paper
  it won’t work in the real world

Jim’s Corollary
If it does work on paper
  it still may not work in the real world
Project Notebook
what it is

• Composite results of market identification and bio-programming
• Describes a properly evaluated and functional facility
• Includes cost projections, construction and operations schedule
Project Notebook
what it does

• Enables immediate decisions without further work
• Provides a framework to sell your idea to financial backers
• Guide for subsequent phases of development in spite of
  – Postponements
  – Changes in permitting
  – Changes in designer
Where do I start?

- Road map - Business Plan
  - Market Identification
  - Bio-programming
  - Facility characterization
  - Financial analysis
  - Environmental impact (Permitting)
Resources

• RAC publications
  – ncrac.org
  – srac.tamu.edu
  – nrac.umd.edu

• White Papers
  – aquanic.org

• Aquaculture associations
  – wisconsinaquaculture.com

• Extension specialists
  – Aquaculture.uwsp.edu
Market identification: finding a hole in the market
(see rule #4)

• Fish species
  – Outdoor- environmental limitations
  – Indoor- market limitations

• Target audience
  – Wholesale
  – Retail
Market identification

• Product(s)
  – Product form
  – Value added
  – Vertical integration

• Pricing
  – Market price
  – Premium price
  – Breakeven price

• Production level
  – Quantity
  – Flow
Ultimately the question to be answered is: How is my product different from existing products in the marketplace?

Some of the answers to this question are: convenience, quality, price, feel-good factor

Know and understand your competition!
Bio-programming: if you feed it, will it grow

• Goals
  – Statement of intent, purpose, and methodology
  – The what, why and how of the project
Biological criteria

• Species description
  – Propagation and life cycle
  – Production cycle
• Behavioral characteristics
  – Negative attributes
• Culture techniques
  – Propagation
  – Juvenile needs
  – Grow-out method
Biological criteria

• Environmental requirements
  – Water quality
  – System limitations

• Nutritional requirements
  – Feed conversion ratio
    • Lbs of feed/lbs of weight gain
  – Live
    • Minnow size is critical
  – Formulated feeds
    • Fish meal vs grain based diets
Biological criteria

- **Growth rates**
  - Time to market size
  - Relevance to production cycle
- **Mortality rates**
  - Survival at different life stages
- **Diseases**
  - Veterinary needs
  - Biosecurity
Facility characterization

• Integrates goals, design criteria, financial constraints, and site conditions into a functional and operational plan.
Facility programming

• Production schedule
  – Populations at each life stage
  – Water and space needs

• Infrastructure
  – Water system
  – Production space
  – Support space
    • Feed and equipment storage
    • Processing area
    • Transfer/holding facilities
    • Office space
Production fits site
or
Site fits production

• Predetermined site
  – Economic viability given limits imposed by site constraints

• Undetermined site
  – Optimize biological and physical requirements
Schematic design

- Translates criteria and site constraints into a workable design
- Identify and solve major design problems
- Verify no constraints to production goals
Results in:

- Report describing facility design concept
- Site layout with location of major components
- Floor plans for support buildings
- Schematic diagram of hydraulics, air and power systems - REDUNDANCY!
- Topographical survey-emphasis on water flow
- Preliminary construction cost and schedule
Financial analysis

• Financing source(s)
  – Bank
  – Investors
  – Personal wealth
Financial analysis

• Cost/benefit requirements of owner and financing organization-may require some modeling
  – Interest on borrowed capital
  – Profit distribution to investors
  – Equity in tangible assets
  – Tax considerations
    • Business deductions, depreciation
    • Employee costs
      – Salary, fringe benefits, social security, insurances
Financial analysis

• Phased development
  – Basic necessities/immediate needs
    • Small scale trial
  – Cash flow restrictions
    • Mitigated by vertical integration
  – Room for expansion
  – Change in focus
Environmental analysis

• Influences on the environment
• Positive and negative impacts
  – Wetlands
  – Native and non-native species
  – Water table
Environmental analysis

• Permitting
  – Construction and building permits
    • Zoning and pond construction
  – Fish hatchery license
  – Livestock premises registration
  – HAACP food processing license
  – Well drilling and use permits
  – Retail sales license and sales tax number
Questions?

Unsuccessful businesses do not plan to fail-

They fail to plan!!
Fish choices

• Food fish - depends on water temp
  – Trout, perch, bluegill, tilapia, catfish
• Stocking - source may be a problem
  – Walleye, pike, bass, panfish
• Bait - you can’t raise enough
• Ornamentals
  – Mostly indoors
• Recreation - balance is important
  – Beware of excessive reproduction
Aquaculture systems

- Pond
- Raceway
- Net pen
- Recirculation
- Aquaponics
Fish Ponds
Ponds

• Things to consider:
  – Land
  – Water source
  – Effluent
  – Depth of pond
  – Slopes of sides
  – Power
  – Permits
  – Liners
Flow-through systems
Flow-through systems

- Things to consider:
  - High volume of moving water
  - Effluent
  - Permits
  - Aeration
Recirculating systems
Recirculating systems

• Things to consider:
  – Cost
    • Tanks, pumps, filters and biomedias, UV sterilization
  – Back up power source
Net Pens

A way to use big ponds
Aquaponics is...

...the combination of recirculating aquaculture and hydroponics (soilless plant culture).
General comments

• Very water conservative
• Very productive for plants
• Biosecurity critical
• Fish are a byproduct
• Keep the bacteria happy
• Balance and compromise
• Usually indoors so year-round
• Seasonal hoop houses
• Leafy greens work best
• Fruits need pollination
Aquaponics systems

- Three main systems:
  - Media bed
  - Nutrient Film Technique (NFT)
  - Raft system
Media Bed

- Inexpensive components
- Uses inert media
- Flood and Drain
- Needs less filtration
- Good for fruits and roots
- Seeds sown directly
- Maintenance required
Media bed
Nutrient Film Technique - NFT

- Small reservoir of water
- Can be tiered
- Greens work best
- Fruits need innovative support
- High filtration needs
- Water flow critical
- Expensive to build
NFT
Raft Style

- Cheap to build
- Easy to operate
- Safe for fish
- Production line
- Simple filtration
- Needs germination
- Almost any size
- Best for greens
Raft Style
Fish for Aquaponics

- Tilapia
- Catfish
- Perch
- Bluegill
- Koi
- Not trout!
Plants for Aquaponics

- Leafy greens
- Fruits
- Roots
- Herbs
- Ornamental aquatics
- Flowers
- Ethnic specialties