* BAM-In-A-Box
* Aquaponics
  + Beta (for input Sept–Nov.) <http://www.worldwideteams.com/Contact-Us.html>)

Input to the document should be sent to [bettmickels@worldwideteams.com](mailto:bettmickels@worldwideteams.com) before Nov. 20, 2013

With the following in the subject line:

Subject: Aquaponics Feedback Tab #4 Operations (or whatever tab is applicable). Files that are too large for email should be sent via dropbox link.

* + Final - December online at

http://www.BAMAquaponics.com

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* **Aquaponics – What is it?**
* A natural organic vegetable plant eco-system that has its prime nitrogen source from fish poo. Fish poo is supplemented with limited trace minerals to increase plant growth.
* **Aquaponic – Why?**
* Aquaponics creates fresh, healthy food crops without soil in small spaces with significantly less water. Small farmer production can be designed with minimum costs. Larger commercial production helps decrease worldwide transportation costs. Aquaponics decreases health concerns relating to pesticide use. Aquaponics creates local resources for food, employment, community, and sustainable and profitable businesses.
  + Creation Care
  + Relationship Building
  + Community Building
  + Sharing of Food
  + Sharing of the Gospel
  + Mindset - Food vs. Cash
  + Raise Funds for the Poor
  + Creation of businesses
  + Creation of employment
  + Fresh, healthy vegetables
  + Pollution reduction
* **Aquaponics – Who is Successful?**
  + People who take ownership of the project
  + People who are interested in the outcome
  + People who are engaged
  + People with information, tools, and support
  + People who stay the course



* **Aquaponics - Where?**
* Regions
* Locations
  + Backyards
  + Rooftops
  + Parking Lots
* Types
  + Small Scale – Feed 15 – 40 people per year
    - Single Farmer
    - Hobby
    - Neighborhood Plot
    - Community Garden
  + Medium Scale
    - Schools
    - Orphanages
    - Camps
  + Large Scale
    - Commercial
    - Wholesale Food Supply
* **Free Aquaponics Operations Resources (PDF)**
* The IBCs of Aquaponics – (copy link & paste in browser)
* <http://ibcofaquaponics.com/files/IBCofAquaponics.pdf>
* **Free download of 187-page book on Aquaponics – pass this on to anyone in the training sessions, workshops, BAM forums, information packages as long as document isn’t changed in any way and credit is given to the original author.**
* **The IBC of Aquaponics (PDF)** 
  + What is Aquaponics
  + Guide to Aquaponics
  + Introduction to IBC’s (Intermediate Bulk Container)
  + Building an IBC
  + 45 Examples of Aquaponics with full color, step-by-step diagrams
  + Nitrogen Cycle
  + Frequently Asked Questions
  + Glossary
  + Conversion Table
  + Ph v. Nutrient Scale
  + Northern Hemisphere (NH) and Southern Hemisphere Fruit and Vegetable Planting Guide
  + Ammonia Toxicity Scale
  + Further Reading
* Introduction to Village Aquaponics 2011 (PDF) (copy link & paste in browser)
* <https://www.ecolifefoundation.org/assets/files/pdf/programs/aquaponicsmanual2011.pdf>
* Free download of EcoLife Foundation
  + Introduction to Aquaponics
    - Defining Aquaponics
    - The Magic of the System – Nitrogen Cycle
    - Overview of the System
      * Fish
      * Plants
      * Examples of Systems
      * Filtration – Biological and Mechanical
      * Water Flow
      * Schematic Designs
    - Building Your System
      * Basic parts and supplies
    - Fish
      * Materials
      * Background
      * Fish Needs
      * Maintenance
    - Water
      * Background
      * Maintenance
    - Planting Area
      * Materials
      * Background
      * Maintenance
* **Basic Aquaponic Equipment Needs**
* 1. Container options for fish to live
* 2. Container options for plants to grow
* 3. Water pump to move the water from the fish area to the plant area
* 4. Air pump to supply air for the fish
* 5. Plumbing between the fish container and the plant container
* **Container For Fish To Live**
* Container for fish to live in is based on the size of the aquaponics system. Options include: Rubbermaid or Sterilite container, an aquarium, or wooden frame with a pond liner. Livestock watering troughs, food grade 55-gallon drums, swimming pools, and commercially available aquaculture/aquaponics tanks can also be used.
* Options: 1500 gallon in-ground pond; numerous 55 gallon plastic out-of-ground drums for the fish to live in; indoor options include a 210 gallon aquarium or 135 gallon aquarium.

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|  | * [Hydroton GMHT10L Hydroponic Grow Rocks, 10 Liter Bag](http://www.amazon.com/Hydroton-GMHT10L-Hydroponic-Rocks-Liter/dp/B000FCPDFA%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3DB000FCPDFA) * **Amazon Price:** $7.39 * List Price: $78.27 |
|  | * [Hydroton Leca Clay Orchid/Hydroponic Grow Media - 2 lbs.](http://www.amazon.com/Hydroton-Leca-Orchid-Hydroponic-Media/dp/B004IAM29K%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3DB004IAM29K) * **Amazon Price:** $8.95 |
|  | * [Hydroton GMHT50L 50-Liter Okotau Hydroton Bag](http://www.amazon.com/Hydroton-GMHT50L-50-Liter-Okotau-Bag/dp/B0012V1QAO%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3DB0012V1QAO) * **Amazon Price:** $71.57 * List Price: $69.99 |

* **Container For Plants To Grow**
* Containers for the plants to grow can be simple or complex as the containers for the fish to live in.  Plastic food-grade 55 gallon drums can be cut in half length-wise or in the middle to make equally useful grow beds for media-filled or DWC (deep water culture).  Plastic gutter material or large diameter PVC pipe can be used for NFT channels.
* Containers for the plants to grow in are based on the type of aquaponics system chosen. Combining DWC, nutrient film technique (NFT), and media-filled beds into a hybrid system is acceptable and may work better for your situation than just one type. Find what works and do not be afraid to experiment.
* Some types of plants do better than others in different systems. Lettuce excels in DWC systems, while it suffers in NFT systems. Media-filled beds are the easiest to use for the home aquaponics systems while DWC is superior in a commercial environment. NFT was adapted from hydroponics and can be used successfully where space is a factor. For example, growing strawberries on a 4-6 inch vertical PVC pipe with places for plant pots along its length.
* Media-filled beds require some sort of media. The media can be a commercial type such as Hydroton expanded clay pellets or something cheap and simple like pea gravel. Budgets determine what systems to choose.
* DWC requires some sort of means to float or suspend the plants at the water surface. This can be foam board that floats or a plastic cover with holes cut in it.
* DWC and NFT require plant pots and rock wool, while media-filled beds allow for direct planting into the bed.

|  |  |
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|  | * [Tetra Pond Water Garden Pump 1000 GPH, Ponds 500-1000 Gallons](http://www.amazon.com/Tetra-Water-Garden-500-1000-Gallons/dp/B002RBGFA4%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3DB002RBGFA4) * **Amazon Price:** $49.52 * List Price: $103.99 |
|  | * [EcoPlus Submersible Pump - 396 gph](http://www.amazon.com/EcoPlus-Submersible-Pump-396-gph/dp/B0018X2XT4%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3DB0018X2XT4) * **Amazon Price:** $20.00 * List Price: $27.95 |
|  | * [PP12005 : 120 GPH, Submersible, Hydroponics, Aquaponics, Statuary Pump - 6W](http://www.amazon.com/PP12005-Submersible-Hydroponics-Aquaponics-Statuary/dp/B006M6MSL0%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3DB006M6MSL0) * **Amazon Price:** $13.99 * List Price: $29.99 |
|  | * [Tetra Pond Water Garden Pump 550 GPH, Ponds 50-500 Gallons](http://www.amazon.com/Tetra-Water-Garden-50-500-Gallons/dp/B002RBAVFY%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3DB002RBAVFY) * **Amazon Price:** $37.35 * List Price: $79.49 |

* **Pump To Move The Water**
* Unlike pumps required for aquaculture systems, aquaponics pumps do not move a lot of water. Important factors for buying a pump for aquaponics include:
  + Gallons per hour
  + Wattage used
  + Submersible
* Gallons per hour should equal the total capacity of the system. This includes water in the fish container and water in the container the plants grown in. Water in the plumbing between the pump and the plant container is a factor. This is referred to as head pressure and is measure in feet.
* While there are complex equations to figure out exact head pressure, measuring the length of the plumbing will suffice. Most pumps have a chart showing how the flow is reduced by a certain amount of head pressure. Find a pump that provides the capacity of the system with the amount of head pressure factored in.
* Turn over the water in your aquaponics system one time per hour (slightly more or less is fine).

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|  | * [Marina 75 Air Pump](http://www.amazon.com/Hagen-11112-Marina-Air-Pump/dp/B0048B1M1I%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3DB0048B1M1I) * **Amazon Price:** $7.99 * List Price: $12.49 |
|  | * [Hagen Elite Air Pump for Aquarium - 110 V](http://www.amazon.com/Hagen-Elite-Air-Pump-Aquarium/dp/B0002AQGBK%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3DB0002AQGBK) * **Amazon Price:** $12.59 * List Price: $17.99 |
|  | * [Hagen Elite Air Pump for Aquarium - 110 V](http://www.amazon.com/Hagen-Elite-Air-Pump-Aquarium/dp/B0002AQFZ2%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3DB0002AQFZ2) * **Amazon Price:** $11.99 * List Price: $10.49 |

* **Air Pump To Supply Air For The Fish**
* The air pump that supplies air for the fish needs to provide air to one air stone or bubbler. For more than one fish container, purchase either a powerful air pump to power all of the air stones or bubblers or a small air pump for each container. Also needed are air stone or bubbler and aquarium airline tubing.
* **Plumbing Between The Containers**
* Every angle added between point A and point B reduces the flow rate. Each fitting adds a bit of resistance and turbulence, which reduces flow. These need to be accounted for in the head pressure on your pump. Adding 1% per fitting or angle should compensate adequately.
* PVC is the most commonly used plumbing in aquaponics. It is white and reflects light, which reduces the amount of heat it transfers to the water. It is inexpensive and durable. ABS can be used, but it will collect heat, which can damage plants and kill your fish. Metal pipe should not be used, as heavy metals released can be toxic to fish. Copper is fatal to invertebrates, which include commonly aquacultured crustaceans such as prawns, shrimp, and red claw crayfish.
* Use the plumbing size specified for your pump on the supply side and a size larger for your return to the fish container.  This will ensure the pump performs properly and restrictions will not cause your plant container to overflow.
* *Resource paraphrased from: Easy, Profitable and Idiot Proof Aquaponics, The Equipment, retrieved May 3, 2013 at http://nolapete.hubpages.com/hub/Easy-Profitable-and-Idiot-Proof-Aquaponics-The-Equipment*
* Guiding principles for creating successful aquaponics systems by Dr. James Rakocy, Aquaponics Research Director, University of the Virgin Islands:
  + Use a feeding rate ratio for design calculations
  + Keep feed input relatively constant
  + Supplement with calcium, potassium and iron
  + Ensure good aeration
  + Remove solids
  + Be careful with aggregates
  + Oversize pipes
  + Use biological pest control
  + Ensure adequate biofiltration
  + Control pH

*Resource retrieved May 3, 2013 from Wikipedia, ):*

* **Top 4 Preventable Problems With Aquaponics**
* 1. Algae

2. Leaking

3. Clogging

4. Replacing Growing Mediums

* **Algae**
* One of the most common and preventable aquaponic problems is the formation of algae. Aquaponic systems are water with nutrients from fish. The combination of water, nutrients and light produces algae. Algae attracts bugs. Fungus gnats will severely damage the plant roots, which can kill crops. The solution includes limiting the light exposure to the nutrients.
* The nutrient tank should be made of dark material to limit light exposure. Along with dark material, a lid for the reservoir is needed. Cut holes no bigger than the pump hose in the lid. A light proof Aquaponic system is a goal in preventing algae.
* **Leaking**
* An Aquaponic system with high water pressure has an increased chance of leakage. The most common source for leaks are the stab fittings and spray emitters. Root growth can cause water backup, however, this is less common.
* Leak issues can be avoided by using a hydroponic system designed for low-pressure pumps, like the nutrient film technique. Leaks can be prevented by using a nutrient reservoir large enough to hold all the water in your system, and by using pipes large enough to handle the systems water flow even after significant root growth.
* **Clogging**
* Clogging can be an issue if you are using drip systems or spray systems in an aeroponics system. A clog can occur because nutrients are being forced through a tiny hole by high-pressure pumps. Filters can be used to reduce the occurrence of these clogging emitters and sprayers.
* Cleaning the Aquaponic system between uses is helpful in preventing future clogging problems. An "easy to clean" system offers easy access to every surface inside the system, either by hand or with a brush. A system is more difficult to clean if there is no lid and the holes are too small, or if there are tight corners or unreachable bends.
* A main concern is time needed to check the system. Examples: Drip systems should be checked two or three times each day to make sure the emitters have not clogged. A few hours without nutrient solution could kill a plant in a fast draining medium.
* **Replacing Growing Mediums**
* A main expense with reusing an aquaponics system is replacing the entire growing medium if necessary. For example if using rockwool you would have to discard the old rockwool and replace it with new rockwool for each new crop. This can easily be a $100.00 expense (or more), even in a small system. Other systems use netted pots filled with expanded clay pellets, lava rocks, or other reusable grow medium.
* The NFT system uses little grow medium and mostly grows the plant roots in standing nutrient solution. This choice saves expense and time of not having to dispose of the old grow medium.
* *Resource paraphrased from article Aquaponic Problems by Ethan Mills retrieved May 3, 2013 from http://ethanmills.hubpages.com/hub/Aquaponic-Problems*
* **What is Business as Mission?**
* ‘Business as mission’ is a contemporary term describing the integration of business goals and the call to the whole church to take the whole gospel to the whole world. It is an answer to the prayer ‘May Your Kingdom come on earth as it is in heaven’, as people and communities are positively transformed through for-profit business activities.
* The idea of integration is important. This is not ‘ministry’ tacked onto business for convenience or business tacked onto ministry. Instead the mission is worked out in and through the business, through its activities, through the products and services and through relationships.
* Business has the potential to generate wealth through a combination of creativity, risk and work. A profitable and sustainable business is able to create new jobs, drive new innovations and increase resources for society. Business can provide goods and services that are needed in a community and is established on a wide network of relationships.
* These activities, products and relationships are integral to business and part of the God-given potential of business to transform society and glorify Him. Business as Mission leverages this potential of business as a force for good in the world. It can address spiritual needs hand in hand with social, economic and environmental needs. Through business we can intentionally tackle poverty, increase quality of life, bring positive social change and carry with us the message of eternal life.
* Business as Mission is a concept that can and should be applied everywhere, but the Business as Mission movement has a special concern for people and places where there are dire economic, social, environmental and spiritual needs.
* Excerpt from [www.businessasmission.com FAQs page](http://www.businessasmission.com/faqs.html), used with permission.
* **Business as Mission Working Definition:**
* There is no one universally agreed definition for Business as Mission, but there are some key common denominators in the global BAM movement. A working definition of Business as Mission used in the 2013 Think Tank is as follows:
* **Business as Mission is:**
* Profitable and sustainable businesses;
* Intentional about Kingdom of God purpose and impact on people and nations;
* Focused on holistic transformation and the multiple bottom lines of economic, social, environmental and spiritual outcomes;

Concerned about the world’s poorest and least evangelized peoples.

**Guide for BAMpreneurs**

**Step-by-step discussion to help others get involved in BAM**

One-Page Guide for BAMpreneurs

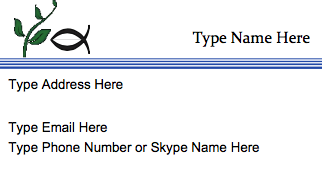
**Guide for BAMpreneurs**

**Explanation and Additional Questions**

* **#1 What is my Business as Mission (BAM) Calling?**
* ***Bible Verse:*** *Therefore go and make disciples of all nations, baptizing them in the name of the Father and of the Son and of the Holy Spirit, and teaching them to obey everything I have commanded you. And surely I am with you always, to the very end of the age.” Matthew 28:19-20 (NIV)*
* How and where is God calling me? Who can I best serve? Why? Is this a long-term BAM commitment over two years or a short term? If this commitment is shorter than two years, what is the number of months? Can I explain my vision? What seeds will be planted based on my passion to pursue Business as Mission?
* **#2 What is my BAM Path?**
* *B****ible Verse:*** *For I know the plans I have for you,” declares the Lord, “plans to prosper you and not to harm you, plans to give you hope and a future. Jeremiah 29:11 (NIV)*
* ***Bible Verse:*** *Whatever you do, work at it with all your heart, as working for the Lord, not for human masters, since you know that you will receive an inheritance from the Lord as a reward. It is the Lord Christ you are serving. Colossians 3:23-24 (NIV)*
* What is the best path for my BAM business? Do I want to work for someone else or start a business cross culturally in a foreign region? Is my passion in a particular part of the world where I am called to help locals hear the gospel? Do I have one particular country that I am trying to enter (or stay in) to spread God’s love by working along side locals in a business? Has a business opportunity come to me through my church that I believe will serve unreached groups?
* **#3 What Industry?**
* ***Bible Verse:*** *So whether you eat or drink or whatever you do, do it all for the glory of God. 1 Corinthians 10:31 (NIV)*
* ***Bible Verse:*** *We are God’s handiwork, created in Christ Jesus to do good works, which God prepared in advance for us to do. Ephesians 2:10 (NIV)*
* Determine the type of industry you are passionate about working in. Do I prefer to work in a product or service industry? Are you interested in importing or exporting? Is there a local market for your industry of preference? Can you differentiate in your industry of choice? Is this an emerging or mature industry? Will you work from your home, an office, a retail shop, a farm, or a manufacturing plant? If none of these types of locations, describe your place of employment.
* **#4 Location – Where am I Being Called to Serve?**
* ***Bible Verse:*** *To the weak I became weak, to win the weak. I have become all things to all people so that by all possible means I might save some. 1 Corinthians 9:22 (NIV)*
* Once you determine where you want to serve, ask yourself why this location? Can I afford to travel there and live there? Will I have problems getting into this country? If so, what issues do you see? Is this a hostile environment for Kingdom work? What research do I need to complete regarding this region?
* **#5 What Business Strategy and Work Experience Do I Have?**
* ***Bible Verse:*** *Each one should use whatever gift he has received to serve others, faithfully administering God’s grace in its various forms. 1 Peter 4:10 (NIV)*
* ***Bible Verse:*** *You are a manager of the gifts God has given to you. They may be great or small in your eyes, but they matter to God. “Now it is required that those who have been given a trust must prove faithful.” 1 Corinthians 4:2 (NIV)*
* Review the previous experience you have in working, leading, or owning a business. Did you help in a family business or work during school? Here are some examples of business experience: Recruiting, coaching or training employees, farming, serving customers, marketing a product or service, working in a factory, negotiating contracts, internet web design, or handling finances. How long did you do this?
* **#6 Do I Need Money to Invest in my Business?**
* ***Bible Verse:*** *The one who plants and the one who waters have one purpose, and they will each be rewarded according to their own labor. For we are co-workers in God’s service; you are God’s field, God’s building. 1 Corinthians 3:8-9 (NIV)*
* Look at the Low, Medium and High levels of money categories. This is a US-based dollar example so adjust this based on currencies or country money valuation. Use your good judgment when determining if you have Low, Medium, or High business investment needs. Seek out advice from other business entrepreneurs.
* **Will I Work In, Start, or Replicate a BAM Business?**
* ***Bible Verse****: For just as each of us has one body with many members, and these members do not all have the same function, so in Christ we, though many, form one body, and each member belongs to all the others. Romans 12:4-5 (NIV)*
* Talk with family and business mentors for advice before proceeding. Align your business skills and total amount of investment with the right model of business to increase number of unreached people groups and profitability. BAM support leaders can help align your business skills and expertise to an appropriate business format.
* Some Options Based on Level of Business Experience:
* 1. Little or None: (a) Work in an existing BAM company under a coach manager; (b) Distribute or sell product where the Distributor provides training and support; (c) Work in a cottage industry – be innovative: Group of students established a profitable business by providing language shopping guidance to foreigners.
* 2. Medium Level: (a) Look for Joint Venture opportunities in your area of interest, (b) Research licensing opportunities, (c) Form alliance with existing business.
* 3. High Level: (a) Start a business using your talents and experience. (b) Buy an existing business or franchise, (c) Merge with an existing business.
* **#7 Available BAM Resources -**
* *Bible Verse: And my God will meet all your needs according to the riches of his glory in Christ Jesus. Philippians 4:19 (NIV)*
* **1. BAM Aquaponics-in-a-Box**
* **2. Recommended Books**
* [**Business as Mission: A Comprehensive Guide to Theory and Practice**](http://www.businessasmission.com/books.html#c260)
* **C. Neal Johnson**   Inter-Varsity Press, January 2010
* [**God is at Work: Transforming People and Nations Through Business**](http://www.businessasmission.com/books.html#c262)
* **Kenneth A. Eldred**  Regal Books, 2005
* [**Great Commission Companies: The Emerging Role of Business in Mission**](http://www.businessasmission.com/books.html#c263)
* **Steve Rundle and Tom Steffen**   InterVarsity Press, 2003
* [**Business as Mission: The Power of Business in the Kingdom of God**](http://www.businessasmission.com/books.html#c264)
* **Michael R. Baer**   YWAM Publishing, 2006
* Help business people explore integrating kingdom-building business as mission perspective into business life.
* [**My Business, My Mission: Fighting Poverty Through Partnerships**](http://www.businessasmission.com/books.html#c275)
* **Doug Seebeck and Timothy Stoner**   CRC Publications, 2009
* Inspiring stories of business people partnering in business as mission.
* [**Business for the Glory of God: The Bible's Teaching on the Moral Goodness of Business**](http://www.businessasmission.com/books.html#c269)
* **Wayne Grudem**   Crossway, 2003
* Business in itself is good and pleasing to God and beneficial to society, from a biblical perspective.

* [Aquaponics Business Plan Outline In PDF Format](http://www.aquaponicspost.com/2012/09/17/aquaponics-business-plan-outline-in-pdf-format/)
* September 17, 2012
* [Download the aquaponics business plan PDF](http://www.aquaponicspost.com/_wordp/wp-content/uploads/2012/09/Acme_Aquaponics_Business_Plan.pdf)
* 40 pages and non-editable PDF business form.
* Level of detail required for serious investors. See categories below:
* **Sample Aquaponics Business Plan Sections:**
* Executive Summary
* Company Summary
* Products
* Market Analysis
* Target Market
* Competition and Buying Patterns
* Web Plan Summary
* Strategy and Implementation
* Kingdom Strategy (example below as this is not included in pdf examples)
* Competitive Advantage
* Financial Plan
* Break Even Analysis
* Projected Profit and Loss
* Projected Cash Flow
* Balance Sheet
* Sales Forecast
* Management Summary
* Personnel
* Milestones
* *Resource Aquaponics Business Plan Outline In PDF Format retrieved May 3, 2013 from http://www.aquaponicspost.com/2012/09/17/aquaponics-business-plan-outline-in-pdf-format/*
* \*Kingdom Strategy Section Example (customize your plan to meet your specific business and Gospel security environment)
* **List bottom-line impacts:**
* Social
* Economic
* Environmental
* Spiritual
* **Practical strategies to enable Kingdom impact:**
* Distribute Great Commission gifts (example: books) during business trips
* Distribute Great Commission gifts during holidays
* Company prayer groups
* Company bible studies
* Company one-on-one discipleship
* Support of local church or missionary workers
* Provide access to foreign like-minded workers
* Part-time employment to enable flexibility to share
* Sharing of testimonies during 1:1 times or when encountering corruption
* Provide training, resources and flexibility to enable workers to start small home groups
* **Practical Kingdom Metrics:**
* # Great Commission Items distributed
* # Active small groups
* # 1:1 discipleship
* # Amount of money generated for local church or m-workers
* Company should be audited to ensure the business conforms to the original Kingdom goals. Audits include: Financial check and Great Commission impact check.

**Locations where you can sell aquaponics vegetables**

* Large Grocery Retail
* Small Local Grocery Stores
* Restaurants
* Farmer’s Markets
* Selling On-site
* **Collaborative Aquaponics Marketing**
* Create interest and support for your project
* Form alliances
* Online – Website, Social Media
* Network to increase aquaponics visibility
* Create local or regional marketing and supply coops
* **Local Vegetable Customers** 
  + - Schools
    - Camps
    - Orphanages
    - Cafes and Restaurants
    - Cooking Schools
    - Food Banks
    - Farmer’s Market
    - Churches
    - Wholesale suppliers
    - Neighborhood Coops
* **Local Fish Customers**
* **Niche Marketing**
* Determine and find the best local vegetable needs
* Specialize in ‘niche’ vegetables to increase revenue
  + Vegetables that are hard to grow are usually in great demand
    - Example: selling strawberries in Thailand
* Create year-round income
* **Logo Marketing Materials**
* 1. Logo
* 2. Letterhead
* 2. Business Card
* 
* 3. Brochure
* 4. Postcard (selling vegetables)
* 5. Postcard (aquaponics training)
* 6. Flyer for (selling vegetables)
* 7. Flyer for (aquaponics training)
* 8. Banner
* 9. Aquaponics Tent for selling (Farmer’s Market, etc)
* 10. Social Media
  + **Website:** BAMAquaponics.com
  + **LinkedIn Group:** Quadruple Bottom Line Aquaponics
    - http://www.linkedin.com/groups/Quadruple-bottom-line-Aquaponics4813773?home=&gid=4813773&trk=groups\_most\_popular-h-logo
  + **Facebook: BAM Aquaponics**
    - https://www.facebook.com/pages/BAM-Aquaponics/605289009494649?skip\_nax\_wizard=true
* Start up Costs (Link to Start up Costs Excel)
* Profit and Loss (P&) Spreadsheet (Link P&L Excel)
* Optimizing Revenue
* Reducing Costs
* Return on Investment (ROI) Model (Link ROI Model)
* Creating Businesses and Employment through Aquaponics Incubation
* Funding Organizations
* used with permission from BAM Think Tank, 2013
* This is not a complete list. There are key funding sources omitted for protection of identity in sensitive areas. Secular organizations (in italics) provide services not currently available through business as mission networks.
* *ACE Development Fund* at [www.acedevelopmentfund.org](http://www.acedevelopmentfund.org)
* REVIEW: Has a goal to plant 10,000 businesses in the next 10 years. They offer a revolving seed fund making initial capital available for pioneer business planting. They teach the basics of entrepreneurship and business in interactive, onsite training programs and follow-up continuing education and resources. ACE coaches connect regularly to mentor and guide new entrepreneurs. They provide a network of partner organizations and social media fundraising campaign.
* *Asia Development Bank* at <http://www.adb.org/>
* REVIEW: Secular funding organization focused on improving lives in Asia and the Pacific. Invest in infrastructure, health care services, financial and public administration systems as well as help nations prepare for the impact of climate change or better manage their natural resources. Main devices for assistance are loans, grants, *policy dialogue, technical assistance* and equity investment. Entities with strong social enterprise components would be good candidates.
* *CGAP Microfinance Gateway* at [www.microfinancegateway.org/p/site/m/organizations/](http://www.microfinancegateway.org/p/site/m/organizations/)
* REVIEW: CGAP is independent policy and research center (housed at the World Bank) dedicated to advancing financial access for the world’s poor. They offer *Microfinance Gateway, which is an online resource of up-to-date information on global microfinance. You may search for financing organizations by type, region, country or base of operations. You can market your organization to Gateway users from around the world.*
* *Double Harvest* at [www.doubleharvest.org](http://www.doubleharvest.org)
* REVIEW: Operates in third world countries to establish and develop agricultural projects by providing capital resources and implementing best practices to increase food production and build local economies.
* *ECLOT* at [www.eclof.org](http://www.eclof.org)
* REVIEW: A microfinance organization working to enhance human dignity so everyone has access to resources needed to become providers for families, employees, churches and communities.”
* *Faithfunder* at [www.faithfunder.com](http://www.faithfunder.com)
* REVIEW: Crowdfunding site focused on projects and causes. Target market is “Every Christian who’s ever had a dream in their heart.”
* *Five Talents* at [www.fivetalents.org](http://www.fivetalents.org)
* REVIEW: Focused on fighting poverty, creating jobs and transforming lives through empowering the poor in developing countries. Use innovative saving and microcredit programs, business training and spiritual development to restore dignity to individuals impacted by natural disasters, ravaged economies or broken political systems.
* *GoFundMe* at [www.gofundme.com](http://www.gofundme.com)
* REVIEW: Crowdfunding site noted as the most popular crowdfunding website for personal causes. The service operates in the U.S., Canada, Australia, The U.K. and in E.U. countries that use the Euro currency.
* *Grameen Foundation* at [www.grameenfoundation.org](http://www.grameenfoundation.org)
* REVIEW: Focuses on the world’s poorest – especially women – and provides access to appropriate financial services, life-changing information and unique income-generating opportunities through microloans and other financial services. They help microfinance institutions and other poverty-focused organizations be more effective and efficient by helping them find financing and provide products and services that enable them to measure results and better understand customers. *Focused on fighting information poverty through mobile phone-based technology projects and business opportunities for poor entrepreneurs.*
* *HOPE International* at [www.hopeinternational.org](http://www.hopeinternational.org)
* REVIEW: A network of microfinance institutions operating in 16 countries. Provide biblically based training, savings services, small loans, mentoring and discipleship. Their microfinance plus programs incorporate health care, literacy training and other community empowerment initiatives. They have small and medium enterprise development programs.
* *Integra USA* at [www.integrausa.org](http://www.integrausa.org)
* REVIEW: Provide training and loans for aspiring entrepreneurs in central Asia, Eastern Europe and Russia. Their microenterprise development program works largely with women due to the loss of a husband (through death or divorce) or who are married to an individual who is disabled. Clients in this program are usually not believers and Integra Staff see this as a “cup of cold water” ministry. Their SME program is for larger Christian entrepreneurial businesses employing from 5 to 250 individuals. Investments range from $10,000 to $250,000. Owners are encouraged to see their work as ministry and communicate the love of Christ to employees, customers and others in the community.
* KIVA at <http://www.kiva.org>
* REVIEW: One of the more successful crowdfunding sites. Aim is to leverage the Internet and a worldwide network of microfinance institutions to alleviate poverty and create opportunity around the world. *Individuals may lend as little as $25 to featured projects. Field Partners vet, distribute and administer loans. Upon repayment they may withdraw their funds or reinvest in another project.*
* *Lightbearers Ministries* at [www.lightbearersconnects.com](http://www.lightbearersconnects.com)
* REVIEW: Through a simple model - buy apartment complexes, house and disciple college students, give the profits away – Lightbearers funds grants for specific projects to advance the Kingdom. Recent projects included a watering station in the desert of northern Africa – a strategic way to reach nomads in the region.
* *Living Stones Foundation* at [www.lsfoundation.org](http://www.lsfoundation.org)
* REVIEW: Grants focused on projects relating to community transformation, family values, business as mission and evangelism. Not currently accepting applications.
* *Mennonite Economic Development Associations (MEDA)* at [www.meda.org](http://www.meda.org)
* REVIEW: MEDA focuses on rural financial services, investment in SMEs, youth and financial services, deposit mobilization and women’s economic development. They consider agricultural development, involvement in the business of health (through accredited drug dispensing outlets, insecticide treated nets and pharmaceutical value chains) and growth of sustainable support.
* *Microfinance Council of the Philippines* at [www.microfinancecouncil.org](http://www.microfinancecouncil.org)
* REVIEW: National (Philippine) network of microfinance outlets including 47 institutions. Key programs include advocacy, social performance management and consumer protection in microfinance, capacity building for microfinance institutions, *performance monitoring and benchmarking, and the establishment of a knowledge and research center for microfinance*.
* *Mission Resource International* at [www.missionresource.org](http://www.missionresource.org)
* REVIEW: Provides financial resources in the form of start-up capital for materials and equipment to fund business ventures. They mentor/coach new entrepreneurs in the skills and stages of business start-up and development. Funded projects at the time of this writing included a canopy and chair rental business (for weddings, funerals and conferences) that provides income for a cross-cultural evangelist in northern Ghana.
* *Oikocredit* at [www.oikocredit.org](http://www.oikocredit.org)
* REVIEW: One of the world’s largest sources of private funding to the microfinance sector; *provides credit to trade cooperatives, fair trade organizations* and SMEs in the developing world.
* *Opportunity International* at [www.opportunity.org](http://www.opportunity.org)
* REVIEW: Provides financial products and strategies in the developing world through loans, savings, microinsurance and training. *Have developed electronic and mobile technology to bring services to the marginalized and remote people. Also crowdfund.*
* *Partners Worldwide* at [www.partnersworldwide.org](http://www.partnersworldwide.org)
* REVIEW: Premier microfinance and finance organization providing models and tools for success and sustainability – including training mentoring, access to capital and advocacy tools.
* *Sovereign’s Wealth Fund/Sovereign’s Capital* – Contact Andre’ Mann at
* amann@sovereign’s capital.com – 1-919-672-5329 – Venture capital firm investing in business as mission enterprises
* *Transformation SME* at [www.transformationalsme.org](http://www.transformationalsme.org)
* REVIEW: Supports the growth and development of Christian-owned and managed SMEs in the Arab world and Asia. Provide financial investment to qualifying SMEs, adding further value through mentoring, coaching and other forms of assistance.
* *Urwego Opportunity Bank of Rwanda* at [www.uob.rw](http://www.uob.rw)
* Serves Rwandans who are economically active but whose banking needs are underserved. As a Christian microfinance bank, they provide opportunities for those in poverty to transform their lives through typical banking services and loan products that include traditional, microbusiness, micro-consumer and other flexible loan products.
* Videre at <http://www.videre.org>
* REVIEW: Provide business training, Christian discipleships and funding to local entrepreneurs in developing markets.
* **Classroom and On-Site Field Demo Training Outline**
* **Estimated Time: 4-5 Days**
* **Prior to setting up training**
* Trainers: In preparation for your training (1) read all the materials in this document including PDFs, article links, and PowerPoint presentations, (2) watch the youtube videos, (3) prepare a training outline specific to the region in which you are training. A sample outline is provided below. The PowerPoints PDFs cannot be changed. Be sure to give credit to the original authors of the open source material.
* **Sample Training Outline**
* **Aquaponic Systems**
  + Overview of Aquaponics
  + System Design and Management
  + 5 Tips for an Aquaponics System Design (Section A below)
  + Aeration
    - Blower Selection and Sizing
  + Plumbing Options
    - Pump Selection
    - Total Dynamic Head
  + Media Comparison (Section B below)
  + Components Needed
  + Construction Designs
  + Operation
  + Electric or Generator Cost
* **Fish Production**
  + Stocking Rates
  + Feeding, Growth and Survival
  + Harvesting and Processing
  + Water Quality
  + Fish Stock Management
  + Breeding
* **Plant Production**
  + Seedling production
  + Pest Identification
  + Disease and Insect Control
  + Nutrient Dynamics
  + Food Safety
* **Marketing and Economics**
  + Marketing customized for Region (See Marketing Tab)
  + 7 Tips in Using Aquaponics for Profit (Section C below)
  + Financial customized for Region (See Financial Tab)
* **Demonstration and Hands-On Instruction**
  + PVC Work
  + Pump Setup and Plumbing
  + Plant Grow Tray Construction
  + Fish Handling
  + Water Quality Testing
* **Conclusion and Review**
  + 10 Guidelines for Aquaponics Systems (by JD Sawyer)
* <http://aquaponicsjournal.com/docs/articles/Ten-Guidelines-for-Aquaponics.pdf>
  + 5 Most Common Aquaponics Mistakes (Section D below)
  + Top 10 Aquaponics Tips (Section E below)

**PowerPoints (PP) PDF**

The PowerPoints PDF presentations below are open source from the Internet. The presentations cannot be changed in any way and credit should be given to the original author. Copy the links and paste in browser.

**PP - Aquaponics – Growing Fish and Plants Together**

Colorado Aquaponics – Presented by: JD Sawyer

<http://www.coopext.colostate.edu/adams/gh/pdf/Intro_Aquaponics.pdf>

**PP – Best Practices and Lessons Learned for Aquaponics in Schools**

Hapa Farms

[Contains good information relating to food safety]

http://www.ctahr.hawaii.edu/sustainag/workshop/downloads/Aquaponics-Classroom/Horner\_HAPAfarms.pdf

**SECTION A**

* **5 Tips for an Aquaponics System Design**
* Retrieved from: homeaquaponicssystem.com
* **1) CHOOSE A MEDIA-BASED DESIGN**
* There are three different styles of systems used in aquaponics for growing plants. These are DWC (deep-water culture), NFT (nutrient film technique) and media –based. The first two are techniques borrowed from hydroponics and are a bit more costly and advanced.
* For beginners to aquaponics, it’s highly recommended that you choose a media-based aquaponics system design. There are several reasons for this:
* It’s a lot easier to learn and understand the process.
* It’s cheaper because it requires less parts.
* A media bed performs all three filtering tasks which includes the mechanical (removes solids), mineralization (breaks down solids and sends back to the water), and biofiltration.
* It acts as an all-in-one function because a media bed is also used as the based to grow plants.
* Media mimics traditional soil gardening much more closely therefore, it provides better support for plants.
* You can find out [how to build a media-based aquaponics system design](http://homeaquaponicssystem.com/go/easy-diy-aquaponics-footer) here.
* **2) USE A BASIC FLOOD & DRAIN DESIGN**
* 
* Out of all the layout designs within a media-based aquaponics system design, the basic flood and drain design is the simplest and most common for home-based aquaponic gardeners.
* The main benefits of this system are:
* It’s easy to build and to understand.
* It doesn’t require much space in your home.
* It’s also the most appropriate for a 1:1 ratio of grow bed to fish tank volume.
* Allows good flexibility as it’s easily customizable.
* Easily maintained.
* You can find out more about the [basic flood and drain aquaponics system design](http://homeaquaponicssystem.com/diy/aquaponics-system-design-flood-and-drain/) here.
* **3) MAKE SURE THAT THE GROW BED IS CORRECT**
* One of the most important components of an aquaponics system design is the area where you grow your plants, so you need to know [how to choose the right aquaponics grow bed](http://homeaquaponicssystem.com/plants/how-to-choose-the-right-aquaponics-grow-bed/).
* It’s not as easy as just getting a large plastic box, filling it up with grow media and then planting your seeds. You need to make sure that the size is ideal for plant growth, the material doesn’t affect anything in the system, and that it’s strong enough to withstand the downward force of the media, plants and water flow.
* **4) CHOOSE YOUR IDEAL LOCATION**
* The location of your aquaponics system rests upon the kind of climate you live in and how much available space you have. In a mostly year-round climate, it would be suitable to based your aquaponics system in the backyard, but for those who are not as fortunate to have such nice weather, there are several other options:
* During the suitable seasons, harvest your plants and fish and when winter or summer arrives, shut down the system until the right season comes around again.
* Do the same as the first option, but instead of shutting down during certain seasons, relocate your aquaponics system indoors.
* Set up and keep your aquaponics system indoors.
* Build a greenhouse and set up in there.
* 
* The first two options can be too much hassle for many people as you would need to start harvesting at the right times to get the best results within a certain period of time.
* Building your aquaponics system indoors requires space, heat and lighting, but it’s convenient especially for high rise apartments. Although there are more considerations, there are many successful aquaponic gardeners who grow exclusively indoors.
* In an ideal situation, a greenhouse would be the best option for anyone with the knowledge and resources. It gives you more flexibility and control over your system. However, it can be expensive but fortunately, there are online guides that teach you how to [build a greenhouse](http://homeaquaponicssystem.com/go/greenhouse-plans) in your backyard.
* **5) GET A READY MADE AQUAPONICS SYSTEM**
* There are a few excellent online guides such as [Easy! DIY Aquaponics](http://homeaquaponicssystem.com/go/easy-diy-aquaponics-footer) and [Aquaponics 4 You](http://homeaquaponicssystem.com/go/aquaponics-4-you-footer) that teach you step-by-step exactly how to build your own home aquaponics system.
* However, no matter how simple those guides makes it, there are some who prefer not to take on such as project by themselves, whether it’s because they find the task daunting, they don’t have the time or they’re afraid of making mistakes.
* This is totally understandable. If this applies to you, then you may want to consider buying a pre-made aquaponics system. Yes it’s expensive ($800+), but you can have a professional and efficient system up and running very quickly, and there are a variety of aquaponics system designs to suit your preference.

**SECTION B**

* **AQUAPONICS GROW MEDIA COMPARISON**
* Retrieved from: homeaquaponicssystem.com
* Here are some of the most popular forms of aquaponics grow media.
* **Expanded Shale** – Mine from a quarry with its origins from the United States, expanded shale is pH neutral and has more rounded edges which makes it easy on the hands and plant roots.
* ****
* **Expanded Clay (Hydroton)** – Also mined from a quarry but usually imported from Germany or China, expanded clay is pH neutral and is easy to handle, but quite expensive.
* **River Stone** – Mined near local rivers, the river stone is heavy but easy to handle. It’s relatively cheap but may contain limestone which will gradually increase pH levels over time.
* **Crushed Stone** – This consists of crushed river stone so it’s also quite heavy and will have the same pH issue. Though crushed stone is very cheap, it usually has sharp edges which will affect plant roots and will be hard to handle.
* **Synthetic** – This is made from petroleum and is also very expensive compared to other grow medias. However, synthetic media is very light and tends to float, and is also easy to handle and pH neutral.
* MEDIA MUST-HAVES
* The following points are properties that your grow media must have in order to maintain an effectively run aquaponics system.
* **Must Not Decompose** – Your grow media must never decompose otherwise the levels of the pH and nutrient will fluctuate out of control. It can also turn your water dark which will make it hard to see your fish because of tannin leaking into the water as a result of decomposition.
* **Must Not Change pH Water Levels** – The grow media must not produce anything that will alter the pH water levels both in the short-term and long-term. The majority of river stones and lava rocks are pH neutral, but be careful of marble and limestone as they have a tendency to produce high pH environments.
* **Must Be The Right Size** – If your grow media is too small, it’ll get clogged up with solid waste and will prevent a good circulation of air and water for your plant’s root zones. Grow media that’s too big won’t allow plant roots to properly establish themselves due to the large air pockets created from big media. Ideally, you want your aquaponics grow media to be approximately 12-18mm in diameter.
* Some other aquaponics grow media properties that it will be beneficial to have is good porosity which holds air and water better and weighs less. This allows for more surface area for the bacteria to establish itself which will result in a more production system.
* **CONCLUSION**
* Determine media options for your Region.
* It is not uncommon for aquaponic gardeners to set up asystem using the wrong type of aquaponics grow media. Then the system’s pH levels end up being uncontrollable. If you use gravel, you must know its source and avoid using limestone and marble.
* If cost is not a big issue, synthetic grow media would be ideal because its lightweight means less force on your [aquaponics media grow bed](http://homeaquaponicssystem.com/diy/how-to-choose-the-right-aquaponics-grow-bed/), and it has the ideal properties for effective plant growth.
* If cost is a significant factor, then expanded shale would be a good choice. Though it’s still not the cheapest (river stone and crushed stone is typically cheaper), it’s inert meaning you won’t have to worry about it affecting the water’s pH levels.

**SECTION C**

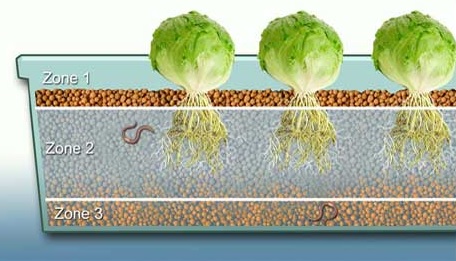
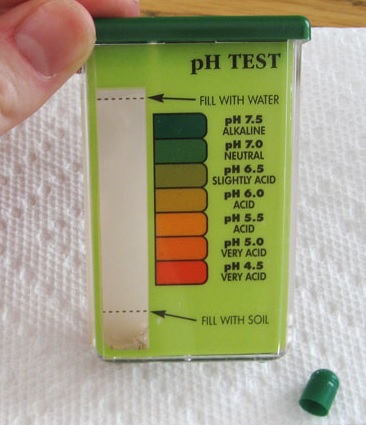
* **7 Tips in using Aquaponics for Profit**
* Retrieved from: homeaquaponicssystem.com
* **1) NETWORK WITH PEOPLE IN THE INDUSTRY**
* Just like with any business in any industry, you will get a massive knowledge booster by communicating with others who are in the aquaponics industry also, as many will have encountered the same issues you’ll be facing.
* You can especially learn a lot from potential buyers such as restaurant owners and chefs who can be a very viable market for same-day produce. Many chefs have interest in the choice to specify exactly what can be grown for them which can lead to a niche market for salad blends and various herbs.
* Since there is a growing demand for locally grown food, wholesalers and local grocery stores will be interested in making purchases from local producers as long as the price is right.
* **2) KNOW YOUR CUSTOMER**
* The chances are that if you’re just starting out, your funds will be limited and you won’t have the resources to compete directly with larger and more experienced growers who can produce faster and cheaper.
* 
* To gain a competitive advantage you will have to know your customer inside out and market your produce directly to them.
* Competing on price alone is practically impossible, but you can offer organic, sustainable and local produce to people, providing that they are the type of people who are willing to pay a premium price for what you’re offering.
* Also, you must know the size of your market and whether it’s sizeable enough to sustain your business model. Do your research and marketing properly to educate potential customers of the benefits that aquaponic produce brings.
* **3) DO YOUR CALCULATIONS PROPERLY**
* There’s no point in doing aquaponics on a commercial scale if it’s not profitable, even if you do have the desire to get people to eat more organically.
* If you decide to sell your produce at a wholesale level, it will mean that you would have to consider two things:
* Can you reduce the price of your produce and still make a healthy profit?
* Can your aquaponics system sustain a wholesale supply?
* If the answer is no, then your only other option would be to sell directly to the end consumer where you will be profitable, but the volume you sell will be limited.
* **4) CONSIDER OFF-SEASON PRODUCE**
* 
* Depending on where you’re based in the world, you may be able to focus on off-season produce if the climate depicts seasonal produce. This would mean that fresh produce will be put away for half of the year but a market for off-season produce will open up.
* It’s a big bonus if you have a local active food and farmers’ market. The main issues that you’ll be faced with is keeping the cost of heating down and if you can manage that, then the opportunity may be a great one.
* **5) CONSIDER A CSA MODEL**
* For many people wanting to use aquaponics for profit, the best approach to their market would be a year-round CSA (Community Supported Agriculture) model which allows members of that group to buy shares of your produce.
* In return, the members have the option to take part in the decision-making process of what you’ll grow and they would also get a per cent allotment of what the greenhouse produces each week. Members would also have to share in any disasters that occurs.
* **6) THINK ABOUT THE FLEXIBILITY OF YOUR AQUAPONICS SYSTEM**
* It’s important that you can grow a wide variety of fruits and vegetables, especially if you decide to go the CSA route. Combining different types of aquaponics systems such media beds and vertical towers for plants that grow fast is a good idea, as is just sticking purely with straightforward [media-based aquaponics systems](http://homeaquaponicssystem.com/basics/what-is-the-best-aquaponics-grow-media/).
* Although raft (DWC – Deep Water Culture) and NFT (nutrient film technique) style systems makes harvesting easier because the plant roots hang freely in the water, they limit the variety of plants you can grow and require solids filtration.
* They’re also expensive and maintenance is time consuming, therefore, you should probably just stick with a system that is more flexible and allows you to react to the demands of your market.
* **7) KNOW YOURSELF**
* Know how you will be using aquaponics to make a profit. Don’t go into commercial aquaponics thinking that you’re ready to take on a large aquaponics project if you’re relatively inexperienced.
* 
* Wait until you’ve built up enough knowledge to understand how everything works, from your own aquaponics system to the business side on things.
* Before selling vegetables there are many problems that you won’t be able to identify immediately such as how healthy your [aquaponic fish](http://homeaquaponicssystem.com/fish/what-aquaponic-fish-to-use/) and plants are or if there are any pH, nutrient of insect problems.
* Do not go into aquaponics purely for the pursuit of profit. Your heart and mind has to be devoted to the farming and business aspects of aquaponics. This means sticking to a routine, being independent, and being on call constantly.

**Section D**

* **5 Most Common Mistakes with Aquaponics**
* Retrieved from: (homeaquaponicssystem.com)
* **1) IGNORING BUG PROBLEMS**
* One of the most common issues aquaponic gardeners have with their plants is the existence of harmful bugs which eat away at the plants. When you spot these critters, it’s best to take care of them before they spread and grow in numbers.
* There are several ways that you can get rid of them:
* **Feed Them To The Fish** – You can turn a problem into a benefit by setting up bug traps and catch slugs, caterpillars and other insect larvae to feed to your fishes. They will enjoy the meal and it’ll also save you a bit of money on fish food!
* **Knock Off With Water Spray** – You can control a large infestation of bugs by spraying a stream of water at them. Also, adding organic solution to the spray can help to repel insects as they’ll become less attracted to the plants.
* **Setting Predators** – Beetles, flies, spiders and wasps are predators to bugs that harm your plants such as aphids. A common predator used for pest control is the ladybird which feeds on aphids.
* **2) ALLOWING THE TANK WATER TO GET TOO HOT**
* Certain [aquaponic fish species](http://homeaquaponicssystem.com/fish/top-7-aquaponics-fish-species/) can handle tropical temperatures while others cannot. It’s important to know the ideal temperatures for the type of fish you’re raising.
* The most popular fish for aquaponic gardeners is the tilapia, which can handle very warm waters, but if waters get too hot especially when exposed to the sun during hot climates, there will be a lack of oxygen for the fishes.
* **3) HAVING TOO MANY FISH IN THE TANK**
* 
* The size of your fish tank and the [amount of fish you have in your aquaponics system](http://homeaquaponicssystem.com/tips-and-techniques/how-many-aquaponic-fish-can-i-grow/) will affect the efficiency of your system. Having a dense population of fish can result in:
* The bigger fish may feed on the smaller fish.
* Too much fish waste for the biofilter to effectively convert.
* The general rule of thumb for a media-based home aquaponics system is one fish for every 20 litres of water. Though professionally monitored commercial systems may stock more densely, beginners should stick to this rule.
* **4) NOT FREQUENTLY TESTING AMMONIA**
* Ammonia is produced by the fishes respiratory system and is discharged through their gills. Ammonia is very toxic to fish and a build-up of it in the fish tank will eventually kill them (dead fish will also produce ammonia).
* Because of this, the ammonia contained in the water in the fish tank must be diluted, removed or converted. To find out the concentrations of ammonia within the fish tank, the water must be tested at least once a week using test kits.
* **5) RESTRICTING ACCESS TO FISH TANKS**
* This is something that even experienced aquaponic gardeners have done, and it can cause many problems. Although setting up your [aquaponics grow bed](http://homeaquaponicssystem.com/plants/how-to-choose-the-right-aquaponics-grow-bed/) directly above the fish tank will save space, it will also restrict access to the fish tanks.
* 
* This can result in the following problems:
* Restricted locations for fish tank and other plumbing components.
* Difficult to see what’s happening in the far corners of the fish tank.
* Difficult to remove and change waters if and when necessary.
* Difficult to catch fishes, especially if they move around the tank quickly.

Think and plan carefully on how to build your aquaponics system to ensure everything is easily accessible for a more efficient running system.

**Section E**

* **Top 10 Aquaponics Tips**
* Retrieved from: homeaquaponicssystem.com
* **1) CHOOSE A MEDIA BED**
* I would highly recommend a media grow bed instead of a NFT (nutrient film technique) and DWC (deep water culture), especially if you’re new to aquaponic gardening.
* This is because a media bed performs three filtering functions:
* Mechanical solids removal filter
* Breakdown of solids and cycle of water known as mineralization
* Biofiltration
* This basically means that it simply does everything all-in-one acting as a very suitable place for plant growth. Not only is using a media bed cheaper, but it’s also easier to understand.
* **2) DETERMINING THE SIZE OF YOUR GROW BED**
* 
* The size of your grow bed dictates the amount of plants you can grow and also the conditions of your plants.
* The industry standard of a grow bed is set to at least 30cm deep to allow the wildest variety of plants to grow healthy and also to provide efficient and complete filtration.
* **3) DETERMINING THE SIZE OF YOUR FISH TANK**
* At least 1,000 litres or more creates a suitable aquaponics system, so assuming you have the flexibility in terms of space, this is recommended. The more you increase the fish tank volume, the better it is for beginners because it allows more room for mistakes as things tend to happen at a slower pace.
* Generally, you would need at least 200 litres volume of water to raise a fish to 30cm in length which is ideal for a “plate size” meal.
* **4) DETERMINING THE RATIO OF GROW BED TO FISH TANK**
* As a basic rule of thumb, you should start with a 1:1 ratio of grow bed volume to fish tank volume. Once your system starts to mature within 4-6 months, you can increase it to 2:1 if you really want to.
* Please ensure that the foundation and supports of your system is sturdy enough to carry the weight of the media, water and plants.
* **5) HOW MANY FISH CAN YOU GROW?**
* If you want to find out [how many aquaponic fish you can grow](http://homeaquaponicssystem.com/fish/how-many-aquaponic-fish-can-i-grow/), first find out the fish weight required by using the ratio rule of 500g of fish for every 0.1 m² of grow bed surface area. Bear in mind that this is based on the assumption that your grow bed is at least 30cm deep.
* Next, figure out the fish tank volume from the rule above which when increased will equate to 1kg of mature fish per 40-80 litres of fish tank volume. Knowing this information will allow you to determine how many fish you can grow in a safe and healthy environment.
* **6) GETTING THE WATER TEMPERATURE RIGHT**
* Different fishes will suit different temperatures in water, so if you want to be on the safe side, then get fish that are adaptable to various water temperatures, or fish that thrive at the water temperature your system naturally responds to.
* Bear in mind that it’s easier to heat up water compared to cooling water. You can attract heat in the water by darkening your fish tank. You can do this by covering it with black sheets or even better by buying a black tank.
* 
* **7) GETTING THE WATER PH LEVELS RIGHT**
* Water pH levels rise during cycling and drop after cycling so it needs to be adjusted. Maintaining the right water pH levels is essential for your fish, plants and bacteria to thrive. You should target a pH between 6.8-7.0 in your aquaponics system.
* If the pH level drops below 6.6, the best way to raise it is to use hydrated lime (calcium hydroxide), potassium carbonate or biocarbonate. If pH goes above 7.6, to bring it down use hydroponic acids such as nitric or phosphoric. Test pH levels every week (ideally around 3-4 times).
* **8) GETTING THE RIGHT FISH**
* The fish you choose depend on three factors:
* Whether you want to eat them or simply showcase them
* The climate and/or water temperature of your location and/or aquaponics system
* Whether the fish are carnivores, omnivores or herbivores
* Once you know the answer to these, which can only be answered by yourself, then you will know what fish to get. You should keep fingerlings separate from mature fish as they may be eaten by them. To find out more about aquaponic fish, check out the [Top 7 Aquaponics Fish Species](http://homeaquaponicssystem.com/fish/top-7-aquaponics-fish-species/) guide.
* 9) FEEDING YOUR FISH
* An adult fish will eat roughly around one per cent of its own body weight every day while baby fish (fry) will eat as much as seven per cent. So as a rule, you should feed your fish as much as they’ll eat in five minutes for one to three times per day.
* It’s important not to feed your fish too much food. If you notice that your fish are not eating anything, this should ring alarms and it probably means that they’re under stress as a result of not being in their optimal temperature range, don’t have enough oxygen or the water pH levels aren’t right.
* **10) GROWING THE RIGHT PLANTS**
* Nearly all types of plants can be grown well in aquaponics, even the likes of tropical plants. However, you may want to avoid plants that prefer an acidic or basic soil environment.
* Just like plants raised in a soil garden, plants for aquaponics can be started just the same by seed, cuttings or transplant. Keep an eye out for insects that will eat away at your plants making them unhealthy after the first few months.

Also, just like for fish, water pH levels are important for your plants to thrive. You must maintain a pH of 6.8-7.0 for optimal nutrient uptake by your plants.

**Books**

|  |  |
| --- | --- |
|  | * [Aquaponic Gardening: A Step-By-Step Guide to Raising Vegetables and Fish Together](http://www.amazon.com/Aquaponic-Gardening-Step-By-Step-Vegetables-Together/dp/086571701X%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3D086571701X) * **Amazon Price:** $16.22 * List Price: $29.95 |
|  | * [The Complete Idiot's Guide to Aquaponic Gardening](http://www.amazon.com/Complete-Idiots-Guide-Aquaponic-Gardening/dp/1615642358%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3D1615642358) * **Amazon Price:** $13.95 * List Price: $19.95 |
|  | * [Building An Aquaponics System (The Backyard Prepper Series) (Volume 1)](http://www.amazon.com/Building-Aquaponics-System-Backyard-Prepper/dp/1481190024%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3D1481190024) * **Amazon Price:** $9.73 * List Price: $12.95 |
|  | * [Mini Farming: Self-Sufficiency on 1/4 Acre](http://www.amazon.com/Mini-Farming-Self-Sufficiency-Brett-Markham/dp/1602399840%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3D1602399840) * **Amazon Price:** $9.70 * List Price: $18.95 |
|  | * [Aquaponic Food Product - Raising fish and plants for food and profit](http://www.amazon.com/Aquaponic-Food-Product-Raising-plants/dp/0977969614%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3D0977969614) * **Amazon Price:** $29.95 |
|  | * [The Biodome Garden Book: The only greenhouse design that needs no electrical ventilation or humidifying system.](http://www.amazon.com/The-Biodome-Garden-Book-ventilation/dp/1463757360%3FSubscriptionId%3D14H876SFAKFS0EHBYQ02%26tag%3Dhubpages-20%26linkCode%3Dxm2%26camp%3D2025%26creative%3D165953%26creativeASIN%3D1463757360) * **Amazon Price:** $7.54 * List Price: $9.95 |

* **YouTube Video Links**
* **1.** [**Aquaponics** - **YouTube**](http://www.youtube.com/channel/HCa6Kx4iXZbW8) www.**youtube**.com/channel/HCa6Kx4iXZbW8‎
* **Aquaponics**, or pisciponics, is a sustainable food production system that combines a traditional aquaculture with hydroponics in a symbiotic environment. In a...
* **2. [Aquaponics](http://www.youtube.com/watch?v=26xpMCXP9bw)** [-](http://www.youtube.com/watch?v=26xpMCXP9bw) **[YouTube](http://www.youtube.com/watch?v=26xpMCXP9bw)**
* [ **► 15:07 ► 15:07**](http://www.youtube.com/watch?v=26xpMCXP9bw)  www.**youtube**.com/watch?v=26xpMCXP9bw Oct 27, 2011 - Uploaded by PurdueUniversity An informational video about **Aquaponics**, the practice of combining fish farming and hyrdoponics. The program **...**
* **3.**  [Murray Hallams Practical **Aquaponics** - **YouTube**](http://www.youtube.com/watch?v=HYR9s6chrI0)
* [ **► 12:44 ► 12:44**](http://www.youtube.com/watch?v=HYR9s6chrI0)  www.**youtube**.com/watch?v=HYR9s6chrI0 Oct 17, 2010 - Uploaded by Murray Hallam Aquaponics **Aquaponics** Made Easy DVD 12 minute version. The full length, 90 minute DVD can be obtained from www **...**
* **4.**[How to build a basic](http://www.youtube.com/watch?v=10kt549AUE4) **[Aquaponics](http://www.youtube.com/watch?v=10kt549AUE4)** [System -](http://www.youtube.com/watch?v=10kt549AUE4) **[YouTube](http://www.youtube.com/watch?v=10kt549AUE4)**
* [ **► 3:43 ► 3:43**](http://www.youtube.com/watch?v=10kt549AUE4)  www.**youtube**.com/watch?v=10kt549AUE4‎
* [Similar](http://www.google.com/search?hl=en&biw=1374&bih=806&q=related:www.youtube.com/watch%3Fv%3D10kt549AUE4+youtube+aquaponics&tbo=1)
* Feb 5, 2008 - Uploaded by Aquaponic A basic guide on how to build your own **Aquaponic** system. This is sytem is based on the barrel ponic and S&S
* **5**. [**Aquaponics** - **YouTube**](http://www.youtube.com/watch?v=tg17Yp1OONo)
* [ **► 9:46 ► 9:46**](http://www.youtube.com/watch?v=tg17Yp1OONo)  www.**youtube**.com/watch?v=tg17Yp1OONo‎
* [Similar](http://www.google.com/search?hl=en&biw=1374&bih=806&q=related:www.youtube.com/watch%3Fv%3Dtg17Yp1OONo+youtube+aquaponics&tbo=1)
* Mar 25, 2009 - Uploaded by kiyafarm My **Aquaponics** system. To find out how to build your own system grab this great ebook **...**
* **6**. [Basic](http://www.youtube.com/watch?v=wS3sej53gx0) **[Aquaponics](http://www.youtube.com/watch?v=wS3sej53gx0)** [System -](http://www.youtube.com/watch?v=wS3sej53gx0) **[YouTube](http://www.youtube.com/watch?v=wS3sej53gx0)**
* [ **► 2:11 ► 2:11**](http://www.youtube.com/watch?v=wS3sej53gx0) www.**youtube**.com/watch?v=wS3sej53gx0‎
* [Similar](http://www.google.com/search?hl=en&biw=1374&bih=806&q=related:www.youtube.com/watch%3Fv%3DwS3sej53gx0+youtube+aquaponics&tbo=1)
* Apr 9, 2008 - Uploaded by AquaponicsAustralia Description of Basic **Aquaponics** System in Australia. Single grow bed media based systems.
* **7.** [**Aquaponics** - Commercial **Aquaponics** - Backyard **...** - **YouTube**](http://www.youtube.com/watch?v=v9zHtgEsT-c) [ **► 1:16 ► 1:16**](http://www.youtube.com/watch?v=v9zHtgEsT-c)  www.**youtube**.com/watch?v=v9zHtgEsT-c‎
* [Similar](http://www.google.com/search?hl=en&biw=1374&bih=806&q=related:www.youtube.com/watch%3Fv%3Dv9zHtgEsT-c+youtube+aquaponics&tbo=1)
* Nov 11, 2008 - Uploaded by socalaquaponics http://www.socalfishfarm.com/fish SoCal **Aquaponics** intends to commercially sell aquaculture equipment, and **...**

**8.** [Internet of food: Arduino-based, urban **aquaponics** in **...** - **YouTube**](http://www.youtube.com/watch?v=3IryIOyPfTE) [ **► 13:37 ► 13:37**](http://www.youtube.com/watch?v=3IryIOyPfTE)  www.**youtube**.com/watch?v=3IryIOyPfTE Jun 25, 2012 - Uploaded by kirstendirksen The land in West Oakland where Eric Maundu is trying to farm is covered with freeways, roads, light rail and **...**

* **9.** [**Aquaponics** Made Easy DVD - **YouTube**](http://www.youtube.com/watch?v=bCV7DABEz20)
* [ **► 2:07 ► 2:07**](http://www.youtube.com/watch?v=bCV7DABEz20)  www.**youtube**.com/watch?v=bCV7DABEz20‎
* [Similar](http://www.google.com/search?hl=en&biw=1374&bih=806&q=related:www.youtube.com/watch%3Fv%3DbCV7DABEz20+youtube+aquaponics&tbo=1)
* Sep 14, 2008 - Uploaded by flashtoons http://www.ecofilms.com.au/ This is a teaser to Murray Hallam's complete DVD to making your own **...**
* **10.** [**Aquaponics** Greenhouse Tour - **YouTube**](http://www.youtube.com/watch?v=CU9x_W9X-tM)
* [ **► 4:11 ► 4:11**](http://www.youtube.com/watch?v=CU9x_W9X-tM)  www.**youtube**.com/watch?v=CU9x\_W9X-tM‎
* [Similar](http://www.google.com/search?hl=en&biw=1374&bih=806&q=related:www.youtube.com/watch%3Fv%3DCU9x_W9X-tM+youtube+aquaponics&tbo=1)
* May 17, 2009 - Uploaded by web4deb http://www.BigelowBrook.com/donate This is a Harbor Freight 10x12 greenhouse that is used for an **...**
* **11.** [More videos for **youtube aquaponics** »](http://www.google.com/search?q=youtube+aquaponics&hl=en&biw=1374&bih=806&source=univ&tbm=vid&tbo=u&sa=X&ei=FfeDUY_nMIqLiAL4noDgCQ&sqi=2&ved=0CGQQqwQ)
* **Websites**
* Aquaponics websites continue to be developed and available all over the Internet. Websites come and go and this list will periodically be updated.
* [**www.townsqr.com/snsaqua**](http://www.townsqr.com/snsaqua/index.html)
* The original pioneers of media based aquaponics systems bringing aquaponics to the masses. Visit Paulas’ site or join her aquaponics list where you can talk with people interested in aquaponics from around the world.
* [**www.aquaponics.com**](http://www.aquaponics.com/)
* One of the better websites for information on aquaponics. Based in the United States with an array of information available, including the only publication specifically focused on aquaponics, available both in printed form and also electronic PDF format bi-monthly.
* [**aquaponicgardening.wordpress.com/**](http://aquaponicgardening.wordpress.com/)
* A blog site about what is happening in the aquaponics industry in the US.
* [**www.aquaponica.com.au**](http://www.aquaponica.com.au/index.html)
* Aquaponica is a company in Western Australia, specifically aimed at helping people get aquaponics system set up at their house.
* [**attra.ncat.org/attra-pub/aquaponic**](http://attra.ncat.org/)
* Appropriate Technology Transfer for Rural Areas is a site for information on aquaponics. The site contains information and links to many other sites and sources.
* [**www.cabbagehillfarm.org**](http://www.cabbagehillfarm.org/)
* Ethical food production, including a reasonable size aquaponics system, and other farm production systems and heritage plants and animals.
* [**aquaponics.20megsfree.com**](http://aquaponics.20megsfree.com/)
* A large number of links sorted by subject matter.
* [**http://www.aquaponic.com.au/**](http://www.aquaponic.com.au/)
* Aquaponics company based in Victoria.
* **Articles**
* For a comprehensive list of free articles and free PDF documents on Aquaponics: http://www.backyardaquaponics.com/information/downloads/
* **Business As Mission (BAM) Farms, Coaches, Mentors, Consultants**
* **(1) Chiang Mai, Thailand – Jack & Mary Zumwait;** [jack\_zumwalt@me.com](mailto:jack_zumwalt@me.com)
* “Z” Logos Aquaponics

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| **(2) Philippines - Manny and Sherry**; [manny@galacticomm.org](mailto:manny@galacticomm.org) [www.asiaseedproject.org](http://www.asiaseedproject.org) |

* Aquaponics model without the use of greenhouse and electricity. Region has heavy rains, storms and typhoons until end of November. There is no Internet, no Wi-Fi, no cell sites, and no electrical posts. Plan is to use ducks in the water to aerate the water.
* Aquaponics [or Fish-V-Ponics for this project] is a project in the SEED Project - Asia. Goal is to develop simple projects that can be used as a demo to transfer the technology into the hands of Kingdom workers to help them become sustainable.
* (1) Aqua Farmvest, Nickson Cheah, [nikson62@gmail.com](mailto:nikson62@gmail.com); Indonesia, Thailand, Malaysia and Myanmar
* (2) Earthwize Foods, Scott Moore, Matt Kelly, Josh Imhoff; [info@emergeaquaponics.com](mailto:info@emergeaquaponics.com); USA, Asia, Africa, Latin America. Earthwize Foods operates in Colorado, USA.