AQUAPONIC SYSTEMS FRESH WATER FINFISH COLOMBIA ECOLOGIC BENEFITS

"Over the past quarter century, forests have been cleared from an area the size of India.

Particularly in Central and South America, expansion of pastures for livestock production has been one of the driving forces behind this wholesale destruction".

Ref: FAO Livestock Information, Sector Analysis and Policy Branch Animal Production and Health Division

Tecno Acuicola SAS
Circular 4 No 72-24
Medellín Colombia
Cel: 57-316-745.1129
www.tecnoacuicola.com

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TATA AQUAPONIC SYSTEM ECOLOGIC BENEFITS

1. ABSTRACT

20 tons per month of finfish production obtained from Tecno Acuicolas´s aquaponics' systems -TATA offers the opportunity to replace around 3.200 heads of livestock which is the amount of cattle required to sustain the monthly demand to produce the equivalent 20 ton/month of beef meat. A traditional livestock ranch should require 3.200 Ha to rearing these amount of cattle. Historically in Colombia the farmers has deforested by cutting down an even burning the native forest to clear off land to stablish extensive cattle ranches and/or make crops. Beef is the larger driver of tropical deforestation globally. Livestock is the main GHG producer on agriculture industry and impact negatively the quality of land and water.

Replace the production of this amount of beef meat as well as replace a traditional finfish farm for a TATA system and reforesting the 3.200 Ha of degraded livestock land farm could yield to the following ecological benefits **in a 20 years life span project.**

1. **WATER BENEFITS**
   - **a.** Save of 1.347.879 m^3 comparing to traditional race water finfish culture system
   - **b.** Creation of 144.650 of M^3 due to restoration of degraded land actually used by cattle farming
   - **c.** To avoid to contaminate 1.347.879 of m^3 of water with 80.3 Ton total suspended solids to substitution of traditional finfish hatchery by the TATA system which has no discharges (Close loop System)
2. **ENERGY BENEFITS**
   - **a.** Save of 4,38 millions of KW comparing to traditional RAS of finfish culture system using Tecno Acuicola Pump (TATA Pump)
   - **b.** Saving of 1, 3 million KW additional if the system is back up with a solar, eolic and/or hydraulic power generator.
3. **LAND BENEFITS**
   - **a.** Recovery 3.200 of Ha with native trees to reforest of highly deforested or eroded land used for grazing livestock.
   - **b.** The recovery of these 3.200 Ha restore the watershed areas which provide water to the creeks and small rivers, recovers the soil capacity to store rain water and recover underground aquifers.
4. **AIR BENEFITS**
   - **a.** Bio-carbon sequestration of 9, 4 Million ton of CO_2 for the reforestation with the proposed native Teak tree in the year 20.
   - **b.** Elimination of 96.000 m^3 of enteric methane greenhouse gas by substitution of the equivalent livestock farming. Also a non-quantified manure should yield huge amounts of GHG.

Tecno Acuicola SAS has received recently an offer of more than 120,000 hectares of land affected by deforestation in the Choco Department´s. The community is interested that the land be reforested with native forest and offers to be guardians of the areas to be restored.

Colombia has a great challenge to restore millions of hectares. To achieve that goal requires the participation and commitment of many stakeholders of society as well as the State. Large financial resources are required to implement the projects. Restoration of large areas requires of a sustainable long-term projects. Tecno Acuicola SAS firmly believes that aquaponics industry is part of the solution.

2. INVENTORY OF RESOURCES AND BENEFITS

The following table summarize the amount of resources required to produce the 20 Ton of finfish – Rainbow Trout and the benefits if all the **3.200 Ha** affected by rearing cattle were restored.

DESCRIPTION OF NATURAL RESOURCES AND BENEFITS	Unit	Year1	Year5	Year10	Year20
Density of fish- Trout Case	Kg/m^3	40	45	50	60
Total Fin Fish Production initial 20 ton/month	Ton	240	1320	2820	6420
Reposition of fresh water to run 20 Ton TATA aquaponics system	m3	47	235	470	940
Land for Fin fish Farm	Ha	0,5	0,5	0,5	0,5
Land for Hydroponic	Ha	3,5	4,0	4,4	5,3
Land for Native Tree Nursery	Ha	1,5	1,5	1,5	1,5
Saved Water TATA vs Traditional Finfish Farming	m^3	50.388	277.134	592.052	1.347.879
Saved Energy from TATA Fin Fish Farm	Kw	219.000	1.095.000	2.190.000	4.380.000
Eliminated wastewater discharges total suspended solids from substitution Traditional Finfish by TATA system	Ton	3	16,5	35,3	80,3
Land substitution from extensive Livestock for 20Tn/month beef meat	Ha	3.200	3.200	3.200	3.200
Recovery Land by new native forest.	Ha	200	3.200	3.200	3.200
CO_2 Sequestered by native new forest (Teak case)	Ton	10.965	398.200	1.124.540	9.425.709
Methane emission eliminated from livestock replacement (enteric Only)	m^3	4.800	24.000	480.000	96.000
Food saved due to energetic efficiency for substitution of cattle to finfish	Ton	1,2	33,7	143,8	654,8
Increase of water from native tree reforestation	m^3	7.232	36.162	72.325	144.650
Saved water from cattle's drink water	m^3	69.120	345.600	691.200	1.382.400

TABLE 1: SUMMARY OF ECOLOGIC BENEFITS FOR A FULL PROGRAM OF 20 TON/MONTH OF FINFISH AND RESTAURATION OF 3.200 HA OF LIVESTOCK LAND WITH NATIVE TREES.

3. PROPOSED PILOT

Tecno Acuicola SAS proposes a pilot project to grow 20 ton/month of fish and recover 150 hectares area affected by a cattle farm. The deteriorated livestock land would be reforested with trees of TEAK species in which one of the partners of Tecno Acuicola SAS carried out developments for its cultivation a decade ago. This specie has high commercial value and so that it would incentive the reforestation. This pilot may serve to build up the best practices to develop similar projects in Colombia and on the continent.

DESCRIPTION	USD	Note
Rainbow Trout Aquaponics System	$ 1.600.000	Already presented for investment to Tuluni
Alternative Energy Power Generation Equipment	$200.000	Either Solar –Eolic o Micro Hydraulic or Mix.
Cost of Purchase Land to be reforested with Teak	$1.000.000	150 ha deforested livestock land –pilot project
Reforestation Cost Program	$600.000	Land preparation and Manual TEK Tree Plantation
Precision Agriculture	$200.000	Agriculture Micro drones – Fertilize and Surveillance
Long term ecologic and social educational program	$100.000	With Specialized Ecologic- Social Professionals
TOTAL	$3.700.000	

TABLE 2: PILOT CAPITAL INVESTMENT ALTERNATIVE POWER GENERATION

4. PICTURES

A. THE BIG COLOMBIAN AND GLOBAL PROBLEM – DEFORESTATION – DROUGHT -GLOBAL WARMING

In 2017 deforestation in Colombia increased 40% El Espectador Copyright: http://pacifista.co/la-amazonia-esta-en-una-muy-mala-hora/ .

Low productivity per hectare of cattle ranching and soils impoverished by the loss of nutrients.

Large zone has becoming desert as a product of deforestation

B. THE BIG CHALLENGE:- REFORESTATION OF NATIVE TROPICAL FOREST

https://www.deforestacion.net/reforestacion 4/02/2018 por Susy Alv

https://blog.thepanamaadventure.com

Long term benefits of Teak tree absorbing CO2

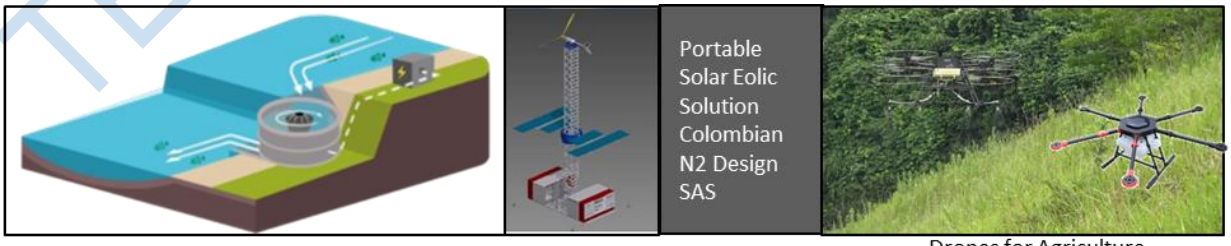
C. SOLUTION: SUSTAINABLE PROJECTS - AQUAPONICS SYSTEMS TO SUPPORT REFORESTATION

Granja Agroagricola Diaguitas Chile

http://bioponica.net/1946-2/

http://infocursos.site/2017/12/19/curso-para-la-acuicultura-por-el-sena/

D. SOLUTION: ECOLOGICAL POWER GENERATIONS IOT AND PRECISION AGRICULTURE



Ecological Fish Friendly Turbine for Power Generation
https://www.turbulent.be

Power Hybrid Generators

Drones for Agriculture