Introduction to Aquaponics

Lifelong Learning Programme

Training on Aquaponics
University of Iceland
June 10th 2015

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EcoPonics
Ecofood from Aquaponics

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My background

- MSc in Chemical Engineering - Biochemistry
- PhD in Corrosion Engineering
- MBA

- „Innovation Center“ (Rb and ITI)
- Energy Authority in Iceland
- Founder and manager of Svinna-verkfraedi ehf.
- Adj. Ass. Prof. at the University of Iceland

Aquaponics – what is this?

- Linking aquaculture and hydroponics
- Using waste water from aquaculture as nutrition for the plants
- Reusing water and lower energy use
- „Zero waste“ production system

AQUAPONICS.IS

Aquaponics – commercially viable?

- Situation today:
  - Small scale research systems
  - Hobby units
  - A few semi-commercial systems
    - Income from training courses, innovation and research funds, sales of equipment and experience tourism
  - Small and medium commercial systems being established all over the world
  - No large industrial unit?

The main challenges?

- Joining different industries
  - Aquaculture and Hydroponics
  - Vermiculture
  - Restaurant / Education / Tourism etc.
- Greater skill set needed
- Differences in traditions / training
- Marketing products – „fishy vegetables“ or fish from „dirty“ water
- Nutrient content of the solution not fully controlled
- Lack of scientific proofs
- Lack of standards
- Need for more simple integrated regulatory and administrative framework?
- Complicated to start?

What is needed?

- Join the correct people?
- Make it sound simple to investors?
- Put up show cases – proof of concept?
- Use of high-tech equipment or simple systems?
- Standards / framework?

Why is aquaponics getting increased interest?

Future global challenges

- Growing population
- Urbanization
- Diminishing resources
  - Water scarcity
  - Mineral recycling, peak phosphorus…
  - Energy sources, peak oil
  - Overfishing
- Food security

Climate change mitigation

- Greener and more environmentally friendly growth
- Transform renewable natural resources into products
- New markets

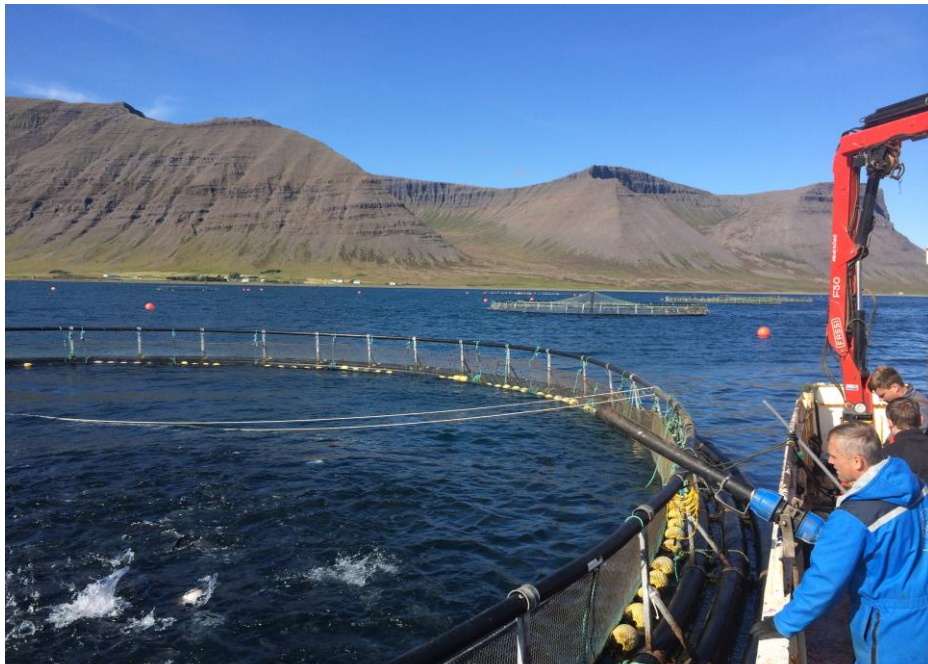
Aquaponics towards a sustainable future

- Turning waste into useful products
- Creating new jobs and growth
- Helping farmers diversify their revenues

Development in aquaculture sector

- Increased interest in sustainability certifications in aquaculture
- Emphasis on use of effluent water
- Improvements in energy efficiency
- Lowering GHG emmisions
- Lowering FCR

- Increased interest in aquaponics and IMTA



Development in horticulture sector

- Often sceptisism towards keeping fish
- Organic farmers often stuck to soil
- Large industrial units with improved environmental control

- Increased interest in aquaponics
- Diversifying the industry

Organic production system

Accepted in the USA

BUT NOT YET in Europe and Canada

IFOAM (International Foundation of Organic Agricultural Movements)

Grown in soil a requirement

Furthermore, issues regarding RAS

USDA (US Department of Agriculture) in North America

Accepts aquaponics as organic – First certification in 2008

Linking different industries creating new ideas

- Aquaculture
- Hydroponics
- Vermiculture
- Insects (edible)
- Health products
- Tourism
  - Educational and Experience (Geothermal)
- Restaurants
- Meeting facilities
- Teaching and training
- Technology development
- Marine IMTA
- Etc

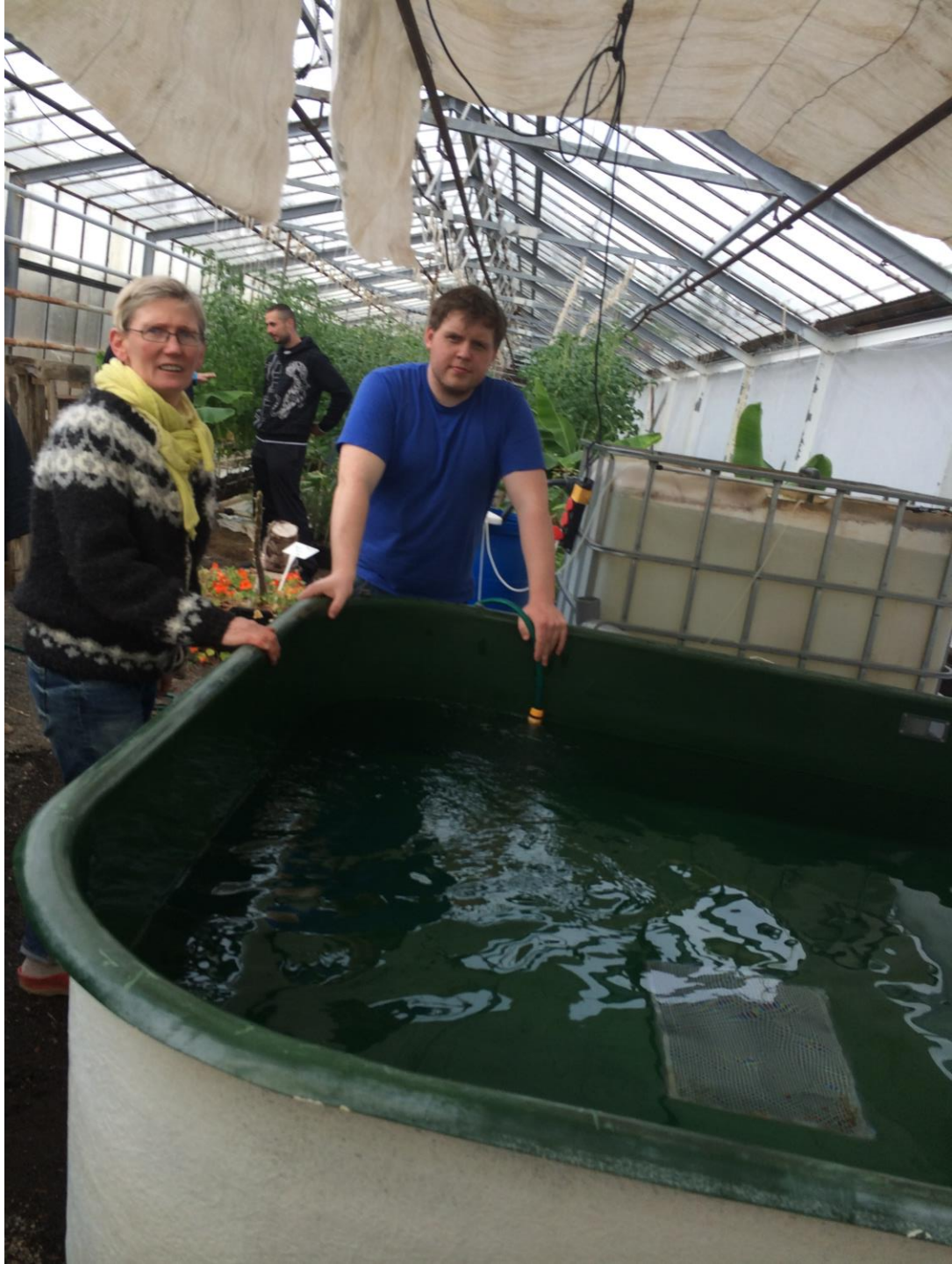
Attracting and joining different industries

Tourism

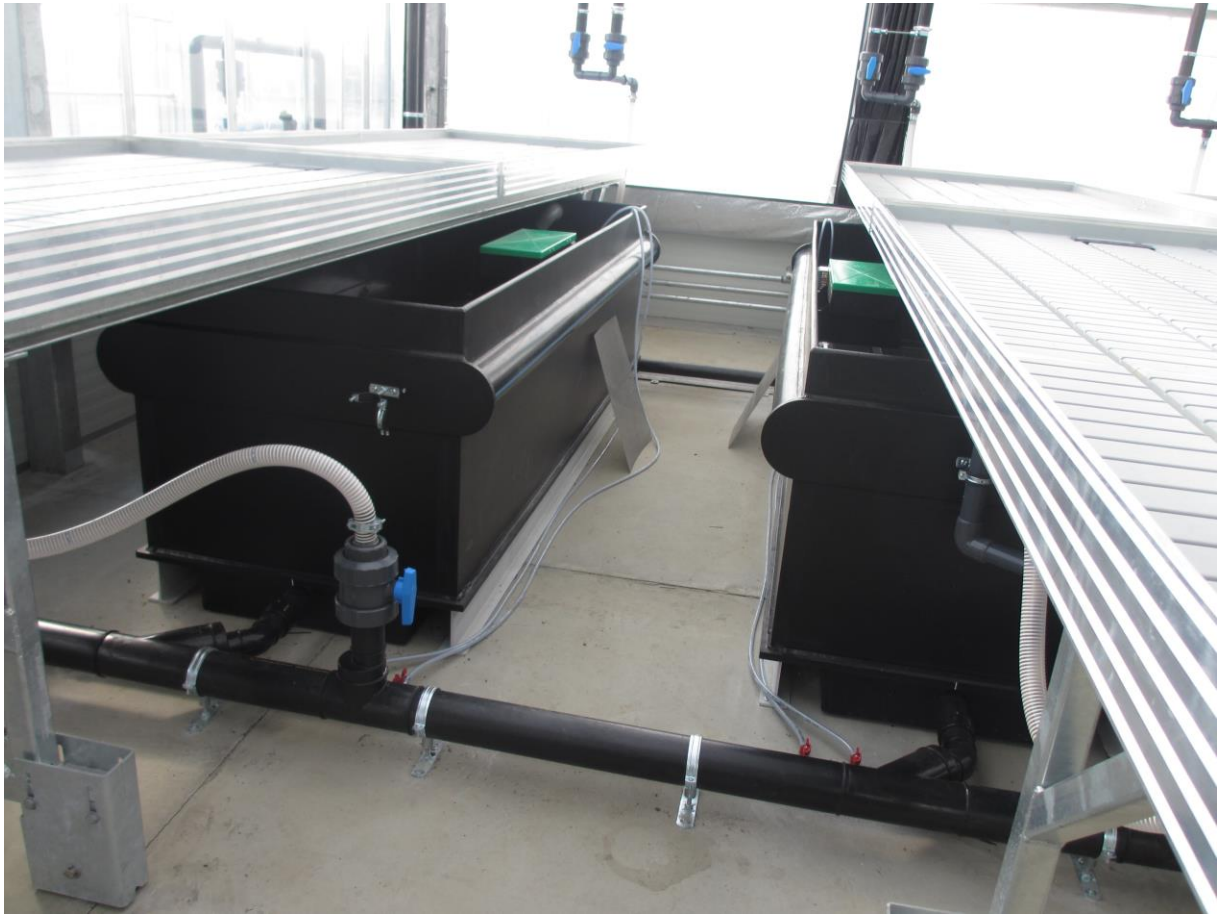
- Increasing steadily
- More than a million tourists in 2014
  - More than three times the countries inhabitants
  - Annual increase estimated 7%
  - 1,500,000 in 2023?
- Experience Tourism
  - Health, food, nature, education

Simple setups…

Linking aquaculture and horticulture…

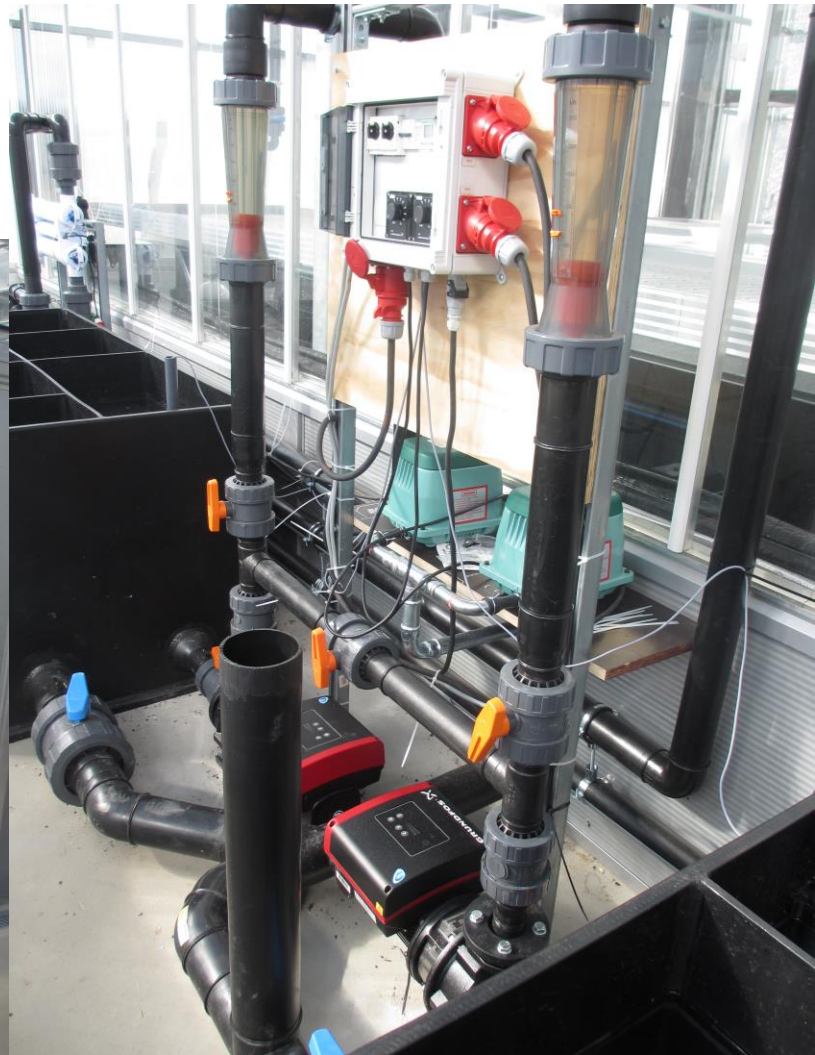


…moving towards modern equipment



…and 2nd generation aquaponics – „decoupled aquaponics“

- Use of modern RAS technology and hydroponics equipment



Strong networks built up – including researchers, entrepreneurs and industries

- COST network
- ESF meeting
- European aquaponics network
- Ecoponics – Ecofood from Aquaponics – Implementing commercial aquaponics in Europe
- Europonics – Leonardo project on vocational training in aquaponics
- National projects
- Nordic RAS 2014 in Denmark
- EAS 2014 in Spain – New Aquaponics session
- EAS 2015 in Rotterdam

Policy makers and standardisation
Investors - banks

Policy and legal reviews across EU and the world

- Situation in different countries?
- In Norway strict rules – even difficult / impossible to import tilapia for research purposes
- In Denmark work going on – could it be possible to seek organic certification for a new methodology?
- In Iceland – we have got import licenses and can do pilot tests – for the next steps towards commercialisation we need to comply with the set of rules both for aquaculture and horticulture – good environment for show cases – also to link with direct use of geothermal, education and experience tourism

Research needed

Technology development – RAS and modern hydroponics technology

Control of nutrient solution

Automatic monitoring and control

Economic viability – show cases in Europe

Review / quantify sustainability potential

The potential of urban aquaponics?

The potential in development countries?

The potential for large scale industrial systems?

Review and develop common research agendas, in consultation with industry and other stakeholders

- Increasing interest from industry
  - Aquaculture companies
  - Greenhouse owners
  - Technology developers

- A need for new standards and regulations
- Production licenses for integrated production
- A need to use best practise from aquaculture and hydroponics and develop this further
- Disease management
- Can „2nd generation Aquaponics“ / „Decoupled Aquaponics“ become the breakthrough needed for large industrial systems?

This publication has been produced with the assistance of the European Union. The contents of this publication are the sole responsibility of Svinna, Breen, IGFF and HI and can in no way be taken to reflect the views of the European Union.

Co-funded by the Eco-innovation
Initiative of the European Union