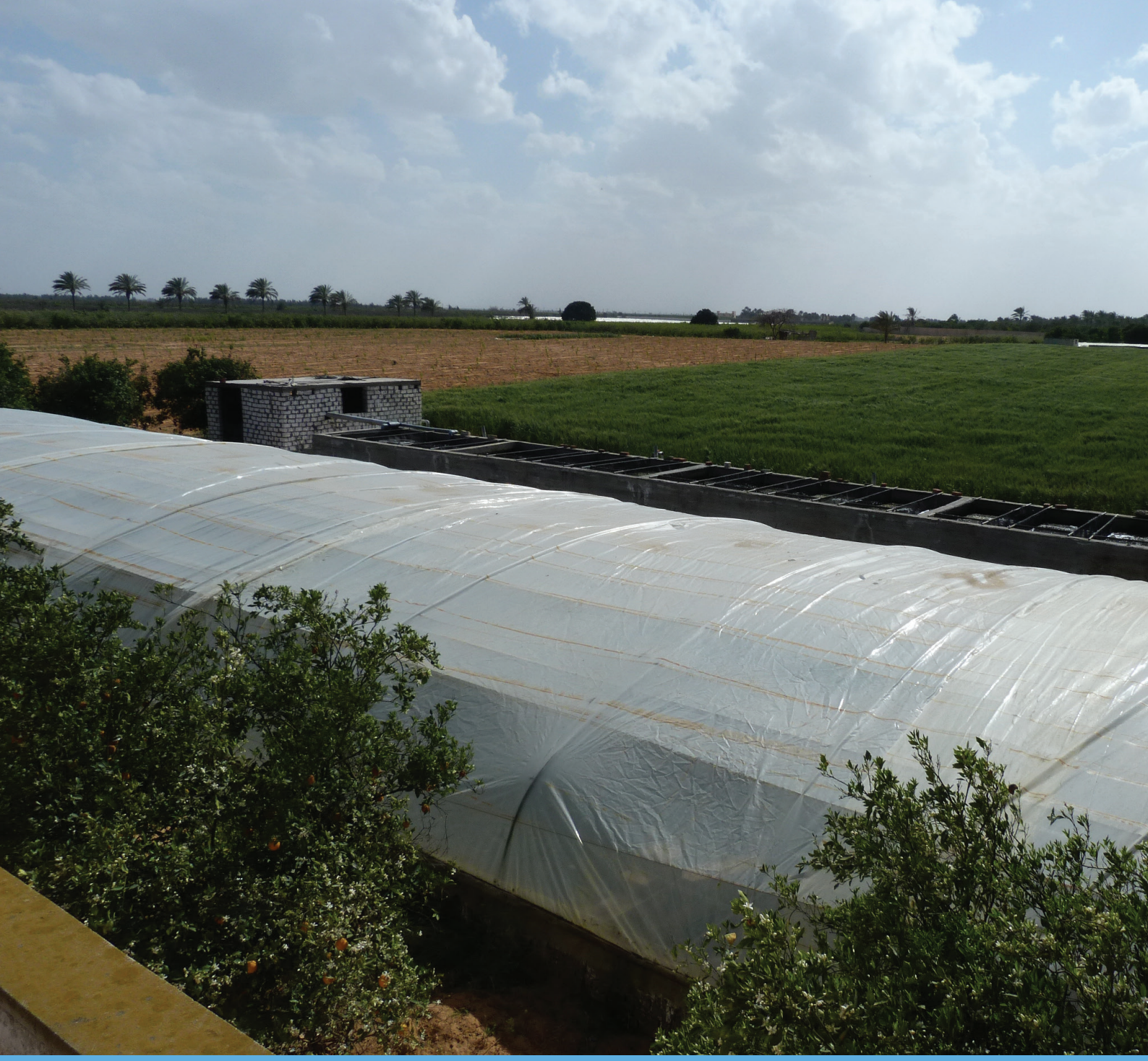

Development and Exchange of Knowledge on Integrated Agriculture–Aquaculture

Report of the workshop on 30 November 2014, on the Preparations for a Community for Development and Exchange of Knowledge (CDEK) on Integrated Agriculture – Aquaculture (IAA) with brackish water

Wouter Wolters, Sherif Sadek, Peter G.M. van der Heijden, Koen Roest, Hakiem El Wagieh, Greet Blom and Edward Schram

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ENCC Egyptian National Competitiveness Council

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Wouter Wolters[1], Sherif Sadek[2], Peter G.M. van der Heijden[3], Koen Roest[1], Hakiem El Wagieh[4], Greet Blom[5] and Edward Schram[6]

1 Wageningen UR - Alterra
2 ACO - Aquaculture Consultant Organisation, Cairo, Egypt
3 Wageningen UR - Centre for Development Innovation
4 Plant Systems, Cairo, Egypt
5 Wageningen UR - Plant Research International
6 Wageningen UR - IMARES

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Abstract
This report provides a summary of the presentations and discussions of a workshop in Cairo (30 November 2014) on Integrated Agriculture-Aquaculture (IAA) with brackish water in Egypt. During the workshop, presentations on the current state of IAA using brackish water in Egypt were given by representatives of the private sector, the research community and government officials. There is considerable interest in the concept and several pioneering companies have already started with fish farming in recirculation systems (RAS) and with IAA in various ways. In the discussions, the need for an informal community to develop and exchange knowledge on IAA was stressed. As well, a need for initiating pilot projects on the subject of IAA with brackish water was expressed. It was commonly agreed that the private sector should take the lead in initiating such an informal Community to Develop and Exchange Knowledge (CDEK) on IAA. The ENCC (Egyptian National Council on Competitiveness) offered to host such community.

Keywords: agriculture, aquaculture, brackish groundwater, arid regions, Egypt, recirculating aquaculture systems RAS, irrigation, fertigation, private sector, SMEs

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Preface

Integration of aquaculture and agriculture – if done properly – offers the advantage that water is used more than once in the same production system and that water productivity will be increased in this way. In addition to increasing water productivity, this integration (referred to as IAA) has also been observed to reduce the need for fertilisers by using the nutrients in the drainage water from the aquaculture ponds or basins.

IAA using brackish (ground)water offers good opportunities in Egypt. There are large pockets of brackish groundwater distributed over Egypt and use of that water could contribute to improve the food security in Egypt by producing high quality protein (fish) and arable crops or vegetables. This has been noticed by many companies and the government, which is clear from their initiatives to develop IAA. Such a fast development of new technologies in an uncoordinated way bears the risk of duplication. That includes not only the risks of inefficiency but also of duplication of efforts and mistakes and this shows the possibilities of bringing all parties interested in IAA together. Brackish groundwater is a finite resource and should be use responsibly.

The purpose of the workshop was to investigate the interest of the private sector, the research community and the Government Authorities to actively participate in a Community to Develop and Exchange Knowledge (CDEK) on Integrated Agriculture-Aquaculture (IAA) systems using brackish groundwater in Egypt. Activities of this CDEK could include sharing experiences and learning about what has been tried and discovered elsewhere in farms and research institutes.

During the workshop the participants were invited to express their commitment to start a learning community consisting of medium-size and larger Egyptian and Dutch companies, members of relevant scientific institutes and representatives of the most relevant institutions of the Government of Egypt (GAFRD, MWRI).

CDEK is foreseen to support the dialogue between the private sector and the government in general and more specifically the Ministries of MALR, MWRI and the Ministry of Environment. Groups of small farmers (Small and Medium Enterprises) will also benefit from CDEK by taking advantage of the experiences of the pioneering larger companies who can function as suppliers of seeds, fingerlings or other farm inputs and/or as buyers of the crops and fish produced by such SMEs (possibly in a contract farming arrangement or otherwise).

The workshop was jointly organised by Wageningen UR (Alterra, CDI-Centre for Development Innovation, IMARES and PRI-Plant Research International); ACO-Aquaculture Consultant Organisation (ACO); Plant Systems; and ENCC-Egyptian National Competitiveness Council ENCC. The workshop was held under the auspices of the Ministry of Agriculture and Land Reclamation and was chaired by Prof Dr Mohamed Fathy Osman (MALR/ Ain Shams University) and Dr Amina Ghanem (ENCC).

List of abbreviations

ACO	Aquaculture Consultant Office
APP	Egyptian Dutch Advisory Panel project for Water Management
WMP	Water Mondiaal Panel for Water Management
CDEK	Community to Develop and Exchange Knowledge
CGIAR	Consultative Group of International Agricultural Research Centres
CLAR	Central Laboratory for Aquaculture Research
DRC	Desert Research Centre
ENCC	Egyptian National Competiveness Council
FAO	Food and Agriculture Organisation of the United Nations
GAFI	General Authority for Investment and Free Zones
GAFRD	General Authority for Fish Resources Development
IAA	Integrated Agri- Aquaculture
ICAPP	International Company for Agricultural Production and Processing
LE	Egyptian Pound
MALR	Ministry of Agriculture and Land Reclamation
MHUUC	Ministry of Housing, Utilities and Urban Development
MOI	Ministry of Investment
MWRI	Ministry of Water Resources and Irrigation
NIOF	National Institute of Oceanography and Fisheries
NWP	Netherlands Water Partnership
PRI	Plant Research International - Wageningen UR
RAS	Recirculating Aquaculture System
RIGW	Research Institute for Groundwater
RVO	Netherlands Agency for Entrepreneurship
USA	United States of America
WM	Water Mondiaal
WUR	Wageningen University and Research centre

Summary

The objective of the workshop was to solicit the interest of the private sector, the research community and the Government Authorities to actively participate in a Community to Develop and Exchange Knowledge (CDEK) on Integrated Agriculture-Aquaculture (IAA) systems using brackish groundwater in Egypt. As such the present workshop can be considered as a follow-up of various previous activities in recent years.

OPENING SESSION
Dr Fathy Osman, as a representative of the Minister of Agriculture, opened the Workshop, emphasising the importance of agriculture and aquaculture as well as their integration in Egypt.
Mr Joost Geijer of the Embassy of the Kingdom of The Netherlands then highlighted the Netherlands Government interest in the subject, which developed over the last and a half to two years.
Dr Sherif Sadek, director of the Aquaculture Consultant Office (ACO), explained the concept of integration of aquaculture and agriculture in Egypt and Koen Roest, of Wageningen UR, expanded on the concept of the Community for Development and Exchange of Knowledge on IAA and the purpose of the meeting.
(all presentations are available at the ENCC website: http://www.encc.org.eg/).

TECHNICAL SESSION
In the technical session, there were nine presentations on IAA, highlighting the various concepts and experiences from different viewpoints.
For the Government, there were presentation from the Ministries of Agriculture and Land Reclamation, Water Resources and Irrigation, and the Ministry of Housing, Utilities and Urban Development.
Next to the presentations of Egyptian and Dutch research institutes, there were also presentations of Egyptian companies. The expertise of Dutch companies active in the aquaculture sector outside The Netherlands was a subject in one presentation.

PARTICIPATION
Over 65 participants attended the workshop, covering a wide range of stakeholders:

Private sector:
Al-Ahram beverages (Heineken); Plant Systems; Agrena Exibition; El-Dakalia Group, Wadi-El-Natroun; Morgan International Co., Egypt; Bostan CO., Egypt; Aquaculture Consultant Office (ACO), Cairo, Egypt; ICAPP/ Americana Group; Skretting (Nutreco); El-Zeini farm; Wadi For Fish Production (Wadi Group); El-Watania co., Ismailia; Techno Green co.; Egyptian Agribusiness Association; Fish Farmers' Association Kafr El-Sheikh; Fayoum Fish Farmers Association.

Government:
Ministry of Agriculture and Land Reclamation various institutions, including the General Authority for Fish Resources Development (GAFRD); Ministry of Water Resources and Irrigation; Ministry of Housing, Utilities and Urban Development; Ministry of Defence; Ministry of Investment, as the General Authority for Investment and Free Zones Ministry of Investment (GAFI).
In addition, there was representation of the Food and Agriculture Organisation of the United Nations.

Knowledge Institutions:
Central Laboratory for Aquaculture Research (CLAR)/ MALR; General Authority for Fish Resources Development (GAFRD)/ MALR; Research Institute for Groundwater (RIGW)/ MWRI; Fish Nutrition Research Laboratory, National Institute of Oceanography and Fisheries, Cairo, Egypt (NIOF); Desert Research Centre, Cairo, Egypt; WorldFish, Cairo/ Abbasa, Egypt; Ain-Shams University; Cairo University; Alexandria University; National Research Center; Wageningen University & Research Centre.

BREAK-OUT GROUP DISCUSSIONS

After the Workshop presentation sessions, the participants split up in three break-out groups, consisting of representatives of the government, private sector, and research institutes.

The outcome of the discussion in brief:

- There is a vast majority of participants in favour of establishing of a Community for Development and Exchange of Knowledge on IAA.
- The reasons for the need of such a community are many and include:
  - sharing experiences and a more efficient development process
  - more efficient use of resources
  - the advantage of working together as a community to develop IAA further.
- Most of the participants (about 75%) were of the opinion that the lead for such a Community could best be taken by the Private Sector. About 20% of the participants suggested that the government should take the lead.
- The role of the Egyptian Private sector could include:
  - executing pilots and spreading results
  - lobby with government and develop innovations
  - contribute to funding, subjects for further research, and capacity building.
- The role of the Egyptian Government could include:
  - establishment of a clear legal framework
  - infrastructure development and services
  - bringing in social and environmental concerns
  - facilitate the collaborative research by the Private Sector and Research institutes
  - decisions on spatial planning and development of a long-term vision.
- The role of Egyptian Research institutes could include:
  - contribute knowledge, innovation and technical support & capacity development
  - looking beyond the economy, to safeguard social and environmental qualities.
- The role of Dutch Private sector could include:
  - sharing of experiences (but adaptation to Egyptian conditions is necessary) and Best Management Practices, training and innovations
  - joint ventures; participation in pilot projects; policy advocacy
  - funding and long-term cooperation
  - assistance with evaluating the global market
  - sharing of experiences of working with the Dutch Government and with NGOs.
- The role of the Dutch government could include:
  - assist with match-making and a facilitating role in study tours
  - contribute funding
  - facilitation with training of Egyptian persons
  - identification of the points of common interests of the various Dutch and Egyptian stakeholders in development of IAA
  - exchange of technical regulations between the Netherlands and Egypt
  - support Egyptian researchers and assist with student-exchange programmes.
- The role of Dutch research institutes could include:
  - sharing of knowledge and experiences to solve Egyptian problems
  - twinning research with the Egyptian research institutes and private sector
  - support with the 'Dutch innovation cycle'
  - exchange of genetic resources, experiments and equipment
  - sharing experiences on protocols for intellectual property
  - bringing in the international dimension: sharing Delta experience from elsewhere.

CLOSING SESSION

Dr Amina Ghanem (ENCC) closed the Workshop/ Round Table with thanking the organisers, the Ministry of Agriculture for their kind cooperation, and all participants for the very effective contributions to the event.

1 Introduction

Egypt has a limited amount of freshwater available for its increasing population and expanding economy. The use of the nation's brackish groundwater resources as an alternative to freshwater for the expanding agriculture and aquaculture sectors has been discussed in earlier conferences and workshops (Alterra (2010); Goulding, I. and M. Kamel (2013); Heijden, Peter G.M. van der, Koen Roest, Faris Farrag, Hakiem El Wagieh and Sherif Sadek (2014); Moen, H., K. Roest & A. Kamstra (2013); Zon, H. van, and A. Rahman El Gamal (2010)). Several projects as well as missions by Dutch and Egyptian consultants that took place in 2013 and 2014 studied certain integrated aquaculture/agriculture systems and came up with the basis for several business cases. A mission that took place in March 2014 reported that the use of brackish groundwater for agriculture and intensive aquaculture, sometimes also integrating the production of fish and crops in one system, had already started but largely in an isolated and uncoordinated way. The mission recommended the set-up of a learning community consisting of the companies pioneering or seriously interested in applying the integrated aquaculture-agriculture (IAA) concept, researchers and the relevant government bodies from both Egypt and the Netherlands. With support of Water Mondiaal, the Netherlands Agency for Entrepreneurship (RVO) made a fund available to hold a workshop where the concept of Integrated Aquaculture – Agriculture was explained, its implementation was explored and the basis for the establishment of such a community was explored.

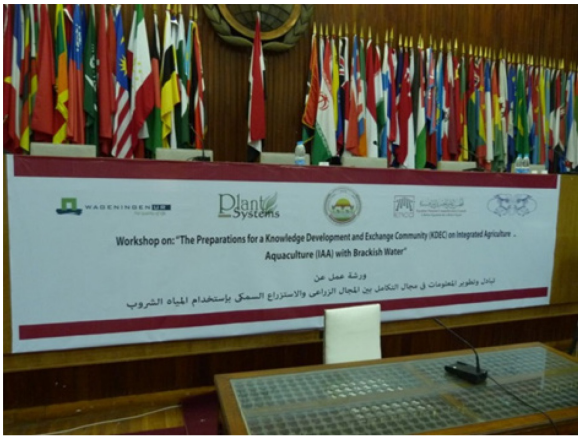
The workshop was prepared by staff of ALTERRA, Centre for Development Innovation, IMARES and Plant Research International (all institutes that are part of Wageningen University and Research centre) and organised with the indispensable support of the Egyptian organisations Aquaculture Consultant Organisation (ACO), Plant Systems and the Egyptian National Competitiveness Council ENCC. The workshop was held under the auspices of the Ministry of Agriculture and Land Reclamation and chaired by Prof Dr Mohamed Fathy Osman (MALR / Ain Shams University) and Dr Amina Ghanem (ENCC). The program of the workshop is found in Annex 1.

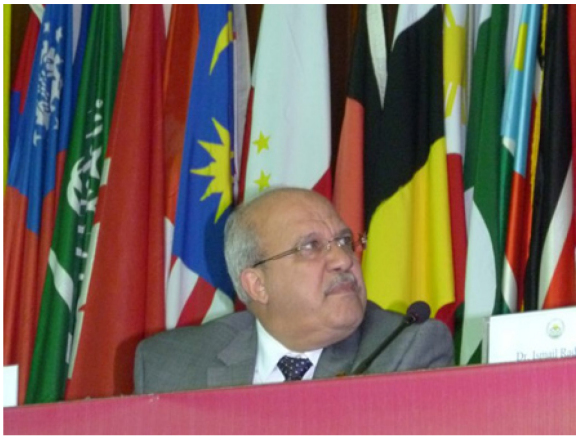
Over 65 participants attended the workshop, covering a wide range of stakeholders:

Private sector:
Al-Ahram beverages (Heineken); Plant Systems; Agrena Exibition; El-Dakalia Group, Wadi-El-Natroun; Morgan International Co., Egypt; Bustan CO., Egypt; Aquaculture Consultant Office (ACO), Cairo, Egypt; ICAPP/ Americana Group; Skretting (Nutreco); El-Zeini farm; Wadi For Fish Production (Wadi Group); El-Watania co., Ismailia; TechnoGreen co.; Egyptian Agribusiness Association; Fish Farmers' Association Kafr El-Sheikh; Fayoum Fish Farmers Association.

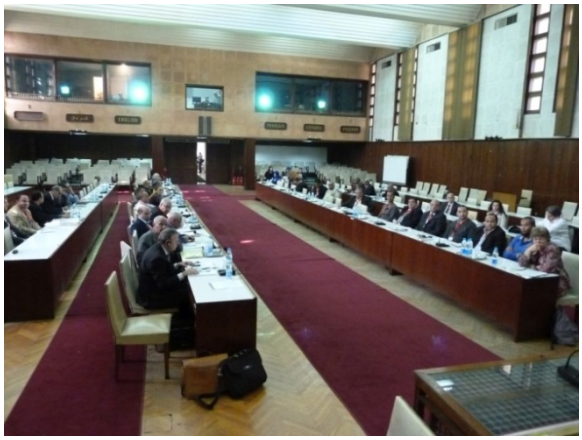
Government:
Ministry of Agriculture and Land Reclamation (various institutions); Ministry of Water Resources and Irrigation; Ministry of Housing, Utilities and Urban Development; Ministry of Defence; Ministry of Investment. General Authority for Fish Resources Development (GAFRD, MALR); General Authority for Investment and Free Zones Ministry of Investment (GAFI-MOI). In addition, there was representation of the Food and Agriculture Organisation of the United Nations.

Knowledge Institutions:
Central Laboratory for Aquaculture Research (CLAR)/ MALR; General Authority for Fish Resources Development (GAFRD)/ MALR; Research Institute for Groundwater (RIGW)/ MWRI; Fish Nutrition Research Laboratory, National Institute of Oceanography and Fisheries, Cairo, Egypt (NIOF); Desert Research Centre, Cairo, Egypt; WorldFish, Cairo/Abbassa, Egypt; Ain-Shams University; Cairo University; Alexandria University; National Research Center; Wageningen University & Research Centre.





Prof Dr Mohamed Fathy Osman



The names of the participants and the institutes and companies represented are found in Annex 2.

All presentations are available at the ENCC website:
http://www.encc.org.eg/inside.php?p=temp_text&pid=100&id=181

2 Opening speeches

Prof Dr Mohamed Fathy Osman (Ministry of Agriculture and Land Reclamation)
Prof Dr Mohamed Fathy Osman (Ministry of Agriculture and Land Reclamation) opened the workshop and welcomed Dr Joost Geijer, representative for Netherlands Embassy, Dr Amina Ghanem (on behalf of Eng. Tarek Tawfik, manager of Egyptian National Competitiveness Council ENCC), Eng. Salama Abo Gomaa (on behalf of Dr Khaled ElHassany), General Authority for Fishery Resources Development GAFRD), guests from Wageningen University and workshop sponsors and co-organizers.

'Ladies and Gentlemen, greetings. Let me at the beginning welcome you and convey to you the greetings of His Excellency Dr Adel El-Beltagy, Minister of Agriculture and Land Reclamation; he would have liked to be here with you now, but he is in a priority meeting outside the Ministry. He asked me to convey his best wishes to you for a successful workshop with specific recommendations to improve the efficiency of integrated aquaculture agriculture activities. This is an interesting field for him and for the Ministry of Agriculture and Land Reclamation, especially in the new lands reclamation, since water is the limiting factor for the sustainability of agricultural activity in these areas.

Let me also thank the Dutch side, represented by the Wageningen University and foreign guests and the Egyptian National Competitiveness council (ENCC) and Aquaculture Consultant Office (ACO) and all those who attend and participate in supporting the establishment of this workshop. The government of the Netherlands and Wageningen University play a major role in supporting aquaculture activities in Egypt, which began in 2004 with participation in studying the fish production status and methods of developments in Egypt. This helped to increase awareness of modern systems for aquaculture and supported also by training courses provided by Wageningen University in collaboration with the World Fish Center in Abbassa Abou Hammad to improve the basic skills for many fish farmers in many Egyptian governorates.

Egypt needs in the next stage to optimize the use of all available natural resources especially water resources to achieve food security for all citizens. The Egyptian aquaculture sector managed to make a true renaissance represented in the increase of fish production despite all the obstacles it faced to reach 1.5 million tonne of fish per year. This ranks Egypt in the ninth place according to the latest statistic issued by international organizations (FAO, 2013) of the ten top aquaculture producing countries.'

Mr Joost Geijer (Agricultural Counsellor, Netherlands Embassy).
'Dear Prof Dr Fathy, dear participants, it is a pleasure to be here today and to share some of the Embassy views on the 'Community to Develop and Exchange Knowledge on IAA' with you. For the last one-and-a-half to two years the Embassy has been involved in the subject and I think it has a lot of potential, especially regarding the policy in Egypt towards improved food security.

The agricultural department of the Embassy works on four topics, which includes: Cooperatives, for which I work closely together with the ENCC, the Egyptian National Competitiveness Council. The second topic is food security. The third topic is Agro-logistics and for this I participated in a meeting last week in the presence of Dr Adel El Beltagy, the Minister of Agriculture and Land Reclamation. The fourth topic is metropolitan agriculture, i.e. food production near the urban areas and also with a link to reducing the carbon footprint.

This meeting of today fits in the food security topic and because I specialised in water management, I find the brackish water dimension of it very interesting. The fact that you are working to integrate agriculture, with aquaculture, with brackish water makes it a triple challenge! We all know that water availability is an important topic in Egypt, especially against the backdrop of an increasing population.

I guess that the subject of integrated agriculture holds many challenges ahead and I wish you a fruitful workshop. It would be good if your efforts today could lead to a programme that would enable us to make headway. Your challenge is to keep-up the momentum. Depending on the result of your deliberations today, we can see how we can extend support from the Embassy. That may need some 'financial engineering', but basically I am very much in favour of the project objectives. I sincerely hope that a good programme of activities comes out that can be endorsed by the relevant authorities.

Thank you very much.'

Dr Sherif Sadek (Aquaculture Consultant Company)
Dr Sherif Sadek summarised in 'The concept of integration of aquaculture in agriculture in Egypt – status, future & recommendations' first the recent growth of fish production and consumption in Egypt. The increase of consumption (from 15 to 20 kg/capita/yr) is due to the increase of aquaculture, of which 70% takes place in earthen ponds.

There are over 100 companies involved in e the integration of fish farms with agriculture activities in the desert that make use of intensive systems and groundwater, together producing 13,000 tons of fish. Twenty projects of them are large commercial scale. As examples of such farms, the production systems of three of them (El Wataneya, El Keram and Rula for Land Reclamation) were discussed in more detail. Ten farms already apply recirculation systems. Dr Sadek concluded that the Egyptian desert aquaculture using brackish water could be a sustainable industry; lower economic returns of conventional crops are acceptable in locations where no other opportunities exist for agricultural production. He recommended to facilitate aquaculture development by actively extending the 3 F's message:
- Fish does not consume, but only uses water;
- Fish farming is a clean production system and
- Fish farming discharge water has added value for agriculture.

Mr Roest (ALTERRA, Wageningen UR)
Mr Roest explained in his presentation titled 'The concept of CDEK for IAA using brackish (ground)water' the concepts of CDEK for IAA:
- CDEK: Community to Develop and Exchange Knowledge;
- IAA: Integrated Agriculture – Aquaculture;
- Brackish groundwater: water that is unfit for drinking water purposes due to its salt content

In addition to the general definition of brackish water (between 500 and 30,000 ppm) he gave two more definitions of brackish water:
- Between 1,000 – 10,000 ppm (USA, National Groundwater Association)
- More than 3,000 ppm (Fishkeeping glossary).

In the legal framework in Egypt it is mentioned that fresh water cannot be used in aquaculture, but the salinity at which fresh water becomes brackish is not defined.

He also explained how in the Netherlands the agricultural knowledge development and exchange system transformed from a Government and top-down organized responsibility towards a community organized activity where private sector parties take this responsibility. In the Netherlands this has resulted in speeding up of the innovations and a huge increase of the water productivity.

Finally, Mr Roest challenged the audience to discuss the concept of CDEK for IAA and to identify partners who want to join in a process to:
- Develop a CDEK for IAA cooperation project
- Participate with knowledge, expertise and/or funds
- Identify the means required for CDEK for IAA.

Koen Roest

3 Presentations by Government Agencies and Research Institutes

Dr Ahmed Sany (General Authority for Fish Resources Development, Ministry of Agriculture & Land Reform)
Dr Ahmed Sany showed in his presentation titled 'Integrated Agri-Aquaculture farms Planned and Implemented by GAFRD' photos with various types of basins of the two project sites GAFRD is developing in Northern Sinai. There are other projects planned in Western Desert (Elsloum, Elwadi Elgadeed) and in Upper Egypt. GAFRD is also developing aquaponics systems.

Dr Akram Mohamed Fekry (Research Institute for Ground Water, Ministry of Water Resources and Irrigation)
Dr Akram Mohamed Fekry showed in his presentation entitled 'Availability of Brackish Ground water – experiences of MWRI' maps that indicated the location of Egypt's main aquafers. Dr Akram showed several maps of the aquifer systems in Egypt, its salinity and its estimated potential. Dr Akram also showed the salinity classification used by the Groundwater Sector of MWRI according to the Hem (1985) water classification:

Fresh water	0 - 1000 mg/l
Brackish water	1000 - 3000 mg/l
Moderately saline	3000 - 10,000 mg/l
Very saline	10,000 - 35,000 mg/l
Brine	more than 35,000 mg/l

The main conclusions presented by Dr Akram include the following:
- Brackish groundwater occurs in almost all Egyptian aquifer systems
- The exploitation of brackish groundwater is still limited for a number of reasons including 1) its occurrence in low demand areas and 2) the connotation that desalination would be needed before it can be used
- The initial salinity of groundwater is estimated between 1,000 and 30,000 ppm and is expected to rise with time, especially in the Pleistocene and Coastal aquifer systems
- The assessment of the brackish groundwater potential is very tentative at the moment both in terms of initial and future salinity and potential and needs further investigations in priority regions.

Dr Magdy El-Gazar (Ministry of Housing, Utilities & Urban Development)
In 1986 the Ministry of Housing Utilities and Urban Communities (MHUUC) representative in the Sinai Reconstruction Authority (SRA) has established the 'Sinai Development Project' (SDP) through an agreement between MHUUC and the World Food Program (WFP). The purpose of the project is to settle the Bedouin nomads with the use of the available infrastructure.

The SRA has started a new project stage by the integrated development project for the people of the Sinai by maximization the use of underground water located in the area to integrate agriculture and aquaculture projects. The project target is to farm 1,000 feddan using the fish farming effluent water for 32 Bedouin communities to produce protected agriculture (greenhouses) and normal agriculture zones. The benefit is the use of the nitrogen and phosphorus elements available in the aquaculture effluent water as a source of fertilizers for the crop.

Until today eight Bedouin communities have completed projects on the establishment of 50 feddan agricultural land integrated with the production of aquaculture and sheep farms. Each community project will be managed following this strategy:
- the use of brackish groundwater which is fluctuating from 800 to 6,000 ppm
- the production of different type of farmed fish (Nile tilapias, mullets and African catfish)

- the management of the fish farm using stocking rate ranging from 15 to 20 kg of fish/m^3
- the use of extruded fish feed with suitable different feed formulations for all fish growing stages.

Future prospects are:
- Achieving self-sufficiency from fish for communities through the establishment of a fish hatchery and a feed mill unit
- Achieving an economic return halophyte plants growing on the high salinity effluent of marine farms from the cultivation of marine aquatic species (such as sea bream, sea bass, shrimp, etc.).

Dr Greet Blom (Plant Research International, Wageningen UR)
Dr Greet Blom explained in her presentation titled 'Experiences with the integration of aquaculture and agriculture using saline water' the various mechanism applied by plants to deal with saline water. With regard to salinity she divided agricultural plants in sensitive, moderately sensitive, moderately tolerant and tolerant. A list was shown with many agricultural crops placed in the above categories with regard to salt tolerance. She also presented two integrated farm systems that combined fish and various crops: Zeeland Sole (Netherlands) and the results of the tests with three tolerant crops grown on the saline effluent of the fish farm of Rula for Land reclamation (Egypt). As the way forward for integrated Aqua-Agriculture using brackish water. Dr. Blom presented the following agenda of activities:
- Optimization of integrated design
- Consequences and risks (pests and diseases, optimal connection different flows, surplus, ..)
- Quantification and cost effectiveness
- Development of growing guides
- Implementation in practice.

Dr Greet Blom

Dr Hassan El Shaer

Prof Hassan El Shaer (Desert Research Centre, Ministry of Agriculture & Land Reform)
Prof Hassan El Shaer summarised in his presentation entitled 'An Integrated model for livestock – halophytes and salt tolerant fodder crops production system: a successful story' the results of projects and pilots in the western Sinai, western desert and Nile Delta the Desert Research Centre has been involved in. New technologies and salt-resistant (fodder) crops were introduced after a participatory seed production project. The new crops and technologies were tested and extended, the impact on the livelihood of the farmers was evaluated and capacity was built. The most salt-tolerant crops are

sorghum, pearl millet, barley, fodder beet, triticale, quinoa and safflower. In some pilot projects the effluent of fish tanks and ponds was used to irrigate the crops. Prof El Shaer concluded that:

- some halophytes and several salt-tolerant fodder crops could be used in animal feeding without any problems
- special treatment should be applied to enhance their feeding value and utilisation
- integrated aquaculture – saline agriculture is a must in desert areas!

After the presentation of Prof Dr Hassan El Shaer several questions from the audience to the presenters were answered.

Questions and answers

Question about who is paying for the MHUUD activities?

The MHUUD representative mentioned that they did not want to put a burden on the State. In their IAA initiative an area of about 1000 feddan was made available for villagers. The idea is that the selected communities will become a kind of advanced villages and cities and that they will have their profit from the activities.

Question about possible problems with precipitation of salts when using saline water for drip irrigation?

There should be a good drainage system and that is often the real problem. About the sedimentation: we do not find any problem but what we do find is that using gated pipes is better than using drip irrigation.

Question about the groundwater quality and quantity when pumping from non-renewable groundwater?

It is indeed sometimes observed that when pumping from non-renewable groundwater, the groundwater level will go down and the groundwater quality may be getting less due to an increasing salt content.

Are you then not transferring a problem from the underground to the surface?

Although we use salt-tolerant crops, with an increasing salinity level we treat the water before using, in certain circumstances. The treatment is not conventional.

Question about salt-tolerant crops in Bir El Abd?

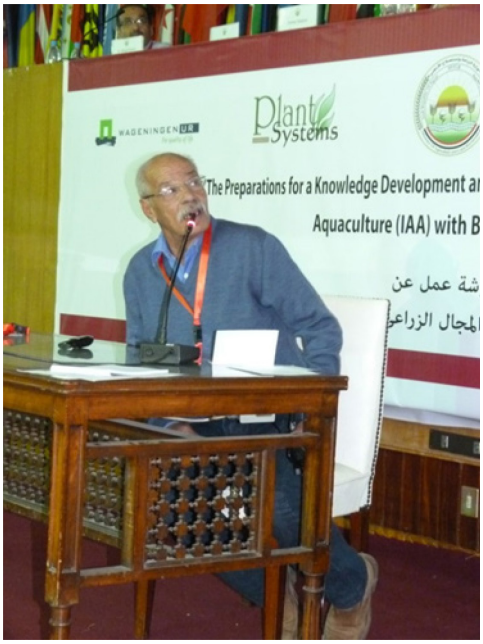
In the Bir El Abd area all kinds of tests are going on and the results are going in the right direction.

Question about aquaculture in the desert?

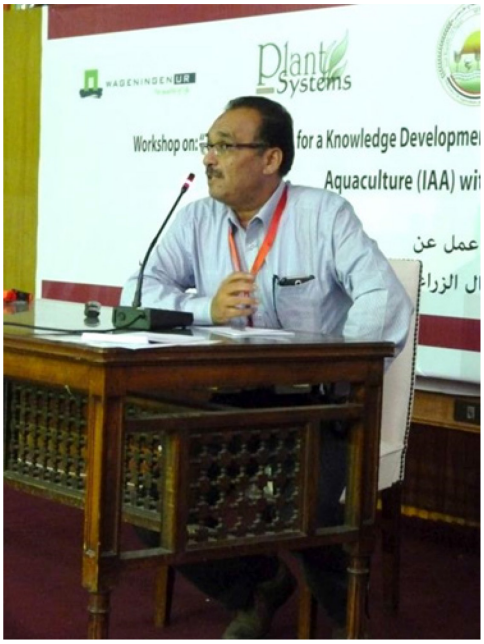
For the integration of aquaculture and agriculture in the desert, you should start with looking at the land. And then you will find the amount of water per feddan on basis of experience.

4 Presentations by Private companies

Dr Ismail Radwan (Egyptian Aquaculture Centre)
Dr Ismail Radwan identified in his presentation 'Aquaculture – Agriculture Integration' the improved profitability and the increased need for technical assistance when IAA is promoted within a legal framework as his personal motives to start an integrated aquaculture-agriculture system on his farm. His intensive recirculation systems consist of a 200 m^3 fish basin plus an aerated bead filter. The sludge that accumulates at the bottom of the filter is drained regularly and successfully used to irrigate wheat and peanut fields. When partial cropping of only the largest fish is applied it is possible to harvest 7.7 tons of fish/unit/year.



Dr Ismail Radwan



Dr Ahmed Zaky

Dr Ahmed Zaky Hegazy (Skretting)
Mr Ahmed Zaky showed in his presentation entitled 'The Role of Feed Quality in Intensive Aquaculture and Integrating Farm Systems' the history of feeding fish in Egypt (from poultry farm wastes to extruded commercial feeds) as well as the contribution of his company to Egypt's total fish feed sales. The more intensive the aquaculture system, the more the fish rely on artificial feed for their nutrition. Referring to the optimum sequence of water use, Dr Zaky concluded that we should aim for Integrated Aquaculture-Agriculture systems instead of Agriculture-Aquaculture as is mostly the case in Egypt today. Egyptians are challenged to think differently, aiming how to maximize the use of each m^3 of fresh water.

Mr Ayman Aniss (Morgan International Technologies)
Mr Ayman Aniss in his presentation entitled 'Synchronising aquaculture and agriculture in Wadi Natrun' sketched the possible productivity and economic return of the intensive, automated Integrated Aquaculture – Agriculture system using brackish groundwater that he is piloting at his farms in Wadi Natrun and Orabi. The system consists of units of 5 acre on which a 1,000 m^3 intensive recirculating fish farm will be build. The fish farm effluent irrigates 3.75 acres of potatoes. Investments for such a unit are one million Egyptian pounds. He hopes to make this system available to a large number of smallholders in sites in the desert. For this development his company will contribute knowledge,

fingerlings, innovative fish feeds, solar panels and the automation systems required to operate the units.

Mr. Ayman Aniss

Mr Edward Schram (IMARES, Wageningen UR)
Mr Edward Schram sketched in his presentation titled 'Possible inputs from the Dutch private sector and research' the present fish farming situation in the Netherlands. The equipment and services that can be offered by the Dutch private companies and Wageningen UR that are all member of the 'Dutch Aquaculture Experts' group were briefly described. This group is backed up by over 25 years of experience with application of Recirculating Aquaculture Systems (RAS) in private commercial farms. Besides from controlled conditions, year-round production, bio-secure facilities and the small surface area that is needed another very important advantage of RAS for water-scarce countries is the greatly reduced water use of 0.2 – 1.0 m^3 per kg fish produced. Most of this water can be used successfully to irrigate crops.

Dutch aquaculture products and expertise can now be accessed through a one-stop-shop approach of Dutch Aquaculture Experts (DAE). This is a group of highly qualified companies and a research institute that are working together to deliver the best aquaculture products and services that the Netherlands has to offer.

5 Break-out group discussions

After the session with presentations by private sector representatives the workshop participants split up in three break-out groups. One breakout group consisted of representatives of the Egyptian government (13 members), the second break-out group consisted of members of the Egyptian private sector (business; 12 members) and the third break-out group consisted of representatives of research institutes (10 members). The number of members is excluding the rapporteur team. Each breakout group answered or discussed the questions that are listed in Annex 3. The reports of the rapporteurs of each break-out group are brought together in Annex 4.

The number of people in each break-out group that would (not) support the establishment of a community to develop and exchange knowledge on IAA is listed in Table 1. From this table we can conclude that with exception of two persons all breakout group participants supported the establishment of such a community.

Table 1

Votes in favour of the establishment of a Community to Develop and Exchange Knowledge on IAA.

	Do we need a CDEK for IAA?			
	Yes	No	Indifferent	Total
Research	10			10
Government	13			13
Private Sector	10		2	12
Total	33		2	35
Average	94%		6%	100%

The response of the Private Sector break-out group to Question 2 (why should such a Community be established?) indicated a focus on sharing experiences, a more efficient development process and a more efficient use of resources as major reasons. In general the members of the break-out group of Government representatives mentioned similar reasons. The break-out group of Researchers added the advantage of working together as a community to develop IAA further as well as various technical and contextual reasons to develop the IAA concept (the abundant availability of brackish groundwater in Egypt, future water shortages, obtaining food security and economic stability, etc).

The opinion of the three subgroups with regard to the answer to Question 3 (which main stakeholder should lead the establishment of such a community) is summarised in Table 2. The break-out group of Private Sector representatives unanimously thought that the Private Sector should lead such a community. Most of the members of the Research break-out group had the same opinion although one thought that the government should initiate such a group and the private sector should take over the leadership in a later stage. In the break-out group of Government representatives the opinions were more varied, with 43% of the members having the opinion that the Government should lead such an initiative and 34% of the members having the opinion that the Private Sector should lead such a community.

Table 2

Votes for the sector who should take the lead in the establishment of a Community to Develop and Exchange Knowledge on IAA.

	Who should take the lead in CDEK for IAA?				
	Research	Government	Private Sector	No opinion	Total
Research:		2	7	1	10
Government:	2	6	5		13
Private Sector:			12		12
Total	2	8	24	1	35
Average	6%	23%	69%	3%	100%

With regard to the response to Question 4 a. (specify the roles of the Egyptian Private sector in a Community to develop and exchange knowledge on IAA) the Private Sector break-out group mentioned doing pilots, the spread of the results (of such pilots), lobby with government and innovations. The Research break-out group members added that the Private sector should contribute funding and subjects for further research. The Government break-out group had similar expectations but also expected the Private sector to contribute to capacity building.

With regard to Question 4 b. (specify the roles of the Egyptian Government in a Community to develop and exchange knowledge on IAA) the Private Sector break-out group mentioned the establishment of a clear legal framework, infrastructure development and services. The Research break-out group expected the government to bring in the social and environmental concerns and to facilitate the collaborative research by the Private Sector and Research institutes. The break-out group of Government representatives added spatial planning aspects and the development of a long-term vision. The general impression from the answers given to this particular question is that the government representatives favour collaboration with the private sector but also expect Government to have a decisive and controlling role (top-down approach).

In response to Question 4 c. (specify the roles of Research institutes) the Private Sector break-out group expected researchers to contribute knowledge, innovation and technical support. The Research break-out group mentioned similar roles and the Government break-out group added capacity development and the concern for social and environmental aspects in relation to IAA development.
In response to Question 5 a. (specify the roles of Dutch Private sector in CDEK) the Research break-out group mentioned the sharing of experiences (but adaptation to Egyptian conditions is necessary) and Best Management Practices, training and innovations. To this list the Private sector break-out group added joint ventures, participation in pilot projects and policy advocacy. The break-out group of Government representatives added funding, long-term cooperation, assistance with evaluating the global market and the sharing of experiences of working with the Dutch Government and with NGOs.
In response to Question 5 b. (specify the role of the Dutch government in CDEK) the Private Sector break-out group expected the Netherlands Government to play a match-making and facilitating role in study tours and to contribute funding. The Research break-out group added facilitation with training of Egyptian persons and identification of the points of common interests of the various Dutch and Egyptian stakeholders in development of IAA. The Government break-out group added to these roles the support to Egyptian researchers, the exchange of technical regulations between the Netherlands and Egypt and various other forms of support. Clearly, the three main Egyptian actors in a CDEK have many and clear expectations with regard to the role of the Netherlands Government in relation to CDEK for IAA.

In response to the question 5 c. (specify the role of Dutch research institutes) the Research break out group mentioned only the sharing of knowledge and experiences to solve Egyptian problems. (This group lacked the time to formulate more roles). The Private Sector break-out group added twinning research with the Egyptian research institutes and private sector and support to the Dutch innovation cycle (as explained in the presentation of K. Roest) in Egypt. The Government break-out group added to this list the exchange of students, genetic resources, experiments and equipment; protocols for intellectual property and bringing in the international dimension, e.g. through sharing Delta experiences from elsewhere.

6 Closure

After all rapporteurs had presented the results of the discussions/ inventories of the three break-out groups in the plenary meeting, the chairperson, Dr Amina Ghanem, thanked all speakers, the participants and organisations that had been involved in the workshop.

A special mention was made of the kind cooperation of the Foreign Affairs Department of the Ministry of Agriculture and Land Reclamation for making the Conference Hall available. Dr Amina officially closed the workshop and invited all to come and enjoy the lunch that was waiting in the restaurant.

7 Acknowledgement

The workshop was organised with the indispensable support of the following Egyptian organisations: Aquaculture Consultant Organisation (ACO), Plant Systems and the Egyptian National Competitiveness Council (ENCC).

It was held under the auspices of the Ministry of Agriculture and Land Reclamation and chaired by Prof Dr Mohamed Fathy Osman (MALR / Ain Shams University) and Dr Amina Ghanem (ENCC). The MALR generously made its Conference Hall available.

The workshop was financially supported by the Water Mondiaal programme of the Netherlands Government.

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Annex 1 Workshop programme

Time	Item	By
8:30	**Registration**	
	OPENING SESSION	
09:00	Opening of the Round Table/ Workshop	Dr Fathy Osman (MALR)
09:10	GAFRD views on IAA	Dr Khalid El-Hassany (Chairman GAFRD)
09:20	Views of the Netherlands Embassy	Dr Joost Geijer (EKN)
09:30	The concept of integration of aquaculture and agriculture in Egypt	Dr Sherif Sadek (ACO)
09:40	The concept of KDEC: Knowledge Development and Exchange Community and Purpose of the Meeting	Dr Koen Roest
09:50	**Coffee/ Tea/ snacks**	
	GOVERNMENT AND SCIENCE SESSION	
10:10	Integrated agriculture and aquaculture projects planned and implemented by GAFRD	GAFRD
10:25	Availability of brackish groundwater, experience of MWRI	Dr Akram Mohamed Fekry, RIGW, MWRI
10:40	Introduction of the MHUUD's integrating agriculture and aquaculture project in the new urban desert cities, Egypt	Dr Magdy El-Gazar, MHUUD
10:55	Experience with integration of aquaculture and agriculture using saline water	Dr Greet Blom (WUR)
11:10	An Integrated model for livestock- halophytes and salt tolerant fodder crops production System: a successful story	Dr Hasan El Shaer (DRC)
11:25	Clarifying questions	
11:30	**Coffee/ Tea/ snacks**	
	PRIVATE SECTOR SESSION	
12:00	IAA in practice	Dr Ismail Radwan
12:15	The role of feed quality in intensive aquaculture and integrated farm systems	Dr Ahmed Zaki (Skretting)
12:30	Synchronising aquaculture and agriculture in Wadi Natrun	Dr Ayman Aniss, Morgan Int.
12:45	Possible inputs from the Dutch private sector: experience in The Netherlands	Dr Edward Schram (WUR)
13:00	Clarifying questions	
	DISCUSSION SESSION	
13:30	Break-Out Groups (with guiding questions) 1. Private sector companies (aquaculture and agriculture) 2. Research institutes (aquaculture, agriculture, water management) 3. Government departments	Rapporteur teams: 1. Amina Ghanem/Koen Roest 2. Faris Farrag/Peter vd Heijden 3. Hakeem El Wagieh/Greet Blom
14:30	Feedback of B.O.G. rapporteurs	Rapporteurs
	CLOSING SESSION	
15:05	Closing remarks	Chairperson
15:10	**Joint lunch**	

Annex 2 Name and affiliation of the workshop participants

Name	Affiliation
Abdalla Abdel Rahman	Agrena Exhibition
Khaled Abdel Moneim	Agrena Exhibition
Mohamed Abdel Baki	Ain-Shams University (Aquaculture department)
George Habib	Al-Ahram beverages co,
Tamer Mostapha	Al-Enmaa co.
Essam E. Shalaby	Alexandria University Halophyte department
Mohamed Shafik	Al-kenana Co
Koen Roest	Alterra Wageningen University and Research Centre
Wouter Wolters	Alterra Wageningen University and Research Centre
Hamdi Abdel- Raouf	Americana Co. Farafrah Oasis
Mohamed Sabry	Aquaculture Consultant Office (ACO)
Sherif Sadek	Aquaculture Consultant Office (ACO)
Walid Salah Eldin	Aquaculture Consultant Office (ACO)
Basem Hashim	Aquaculture specialist
Magdy El-Gazzar	Arab Organization For Agricultural Development
Mohamed Rashad	Arid Lands Cultivation Research Institute (ALCRI)
Mohamed BADRAN	Beyti
Moussa Emira	Bir-El-Abd, private sector agriculture
Nafil Noufal	Bir-El-Abd, private sector agriculture
Faris Farrag	Bostan CO.
Salah Hegazy	Chairman, Agro Food
Sherif El Beltagy	Chairman, BELCO, Egyptian International Co. for Land Reclamation
Abdel Rahman Salama	CLAR, MALR
Salah Hagag	Consultant of desert aquaculture projects
Samir El Naggar	Daltex
Saad	Daltex co.
Hassan M. El-Shaer	Desert Research Centre
Moataz Al Alfi	Egypt Kuwait Holding
Sherif Rashed	Egyptian Agribusiness Association
Samir Goneim	Egyptian Aquaculture Society (chairman)
Ismael A. Radwan	Egyptian Aquaculture Training Centre
Ibrahim Alaam	El Hashemia for Land Reclamation & Development, (ICAPP)
Abdalla Abdel Rahman	El-Dakalia Group, Wadi-El-Natroun
Khaled El-Anani	El-Dakalia Group, Wadi-El-Natroun
Adelrahman	El-Gouna Agriculture Company
Gamal Moktar	El-Keram Farm
Ministry of Defence Veterenian Service	El-Tell-El-Kibir Intensive Fish Farm and integrated horticulture project
Mona Selim	El-Watania co.
Mohamed Salem	El-Zeini farm
Sami El- Zeini	El-Zeini farm
Fady Wagdy	EU delegation
Shahinaz El Semary	EU delegation
Ossama	EVA group
Fathy Abdel Meneim	Faculty of Agriculture, Cairo University
Mohamed Hamdy El-Shafei	Faculty of Agriculture, Cairo University
Paula Anton	FAO
Youhan	Farm co.
Iaman Amar	Fayum Fish Aquaculture Association (FFAA)

Name	Affiliation
Ayman Amaar	FFFA
Mohamed Omara	French Group
Manal Slah	GAFI
Rasha Abdel Nabbi Mohamed	GAFI
Mohamed Abdelhamied	GAFRD
Mohamed El Araby	GAFRD
Khaled El-Hassan	GAFRD
Ahmed Saney	GAFRD
Raafat Zakaria	Golden Foods Co.
Hanee Afia	Gozour
Akram Mohamed Fekry	Groundwater Research Institute
Kamal El Dakkak	ICAPP
Mohamed Yusuf	ICAPP
Mohamed Shaker Hebara	IFAD - CPO
Edward Schram	IMARES Wageningen University & Research Centre
Marawa Mohamed Aly	Institute of Planning
Abdel Salam	Jenaan co.
Safwan Thabet	Juhayna Co.
Alaa Kamar	KAPO
Hani Mohamed Nazmi	Lecturer
Khaled Massoud	MALR Ministers Office
Omar Abdin	Managing Partner, LEAFS
Kamal Khalil	Masreya, Egyptian Company for Land Reclamation
Mohamed Shoukry	Meefad Co.
Magdy El-Gazar	Ministry of Housing Utilities and Urban Communities (HUUC)
General Hamdy Badin	Ministry of Defence
Ehab Saber Youssouf	Ministry of Defence
Hussain Khalafallah	Modern Mariculture Techniques
Ayman Aniss	Morgan International Co.
Hanan Mahmoud	MWRI Groundwater Sector
Ashraf M. Goda	National Institute of Oceanography & Fisheries
Asmaa El- Noukrashi	National Institute of Oceanography & Fisheries (NIOF)
Mohamed Abdel Razek	National Institute of Oceanography & Fisheries (NIOF)
Zaki Sharaawy	National Institute of Oceanography & Fisheries (NIOF)
Hossam Hassan Abbas	National Research Centre
Joost Geijer (EKN)	Netherlands Embassy
Mohamed Salem Abdallah	Nigila, North Siani private sector agriculture
Aly Mohamed Aly	NIOF
Fagr Khamis	NIOF
Mohamed Saoudi	NIOF
Ahmed Zaki	Nutreco, Egypt
Wael Tayel	Pepsico com
Alaa Diab	Pico
Hatem El-Azazi	PICO co.
Wael Badawy	Planet Systems
Greet Blom	Plant Research International, Wageningen UR
Hakiem El Wagieh	Plant Systems
Mahmoud Afifi	Private company in Wadi-El-Natroun (olive trees)
Khaled Alharaky	Private sector –integrated fish farm with agriculture
Mohamed Fathy Osman	Professor of fish Nutrition, Ain-Shams University
Tamer Semida	Savola Co.
Mohamed Yehia	Scientist Fish Nutrition
Wael Rafea	Senior Advisor FIANI co.
Mahmoud Asfour	Skretting (Nutreco)

Name	Affiliation
Khaled Abou Ismael	Sonac
Dalia El-Gamal	SONAC co.
Ahmed Sobhy	Sun Set Co
Mohamed Kamal	TechnoGreen co.
Salah Taher	Wadi For Fish Production (Wadi Group)
Ayman Tayel	Wadi Organic Co
Peter van der Heijden	WUR, Centre for Development Innovation (CDI)
Hussein Mansour	Zoo control Egypt
Mahmoud Abdel Rehiem	
Moussa Emir Emira	

Annex 3 Discussion points for the three Break-Out Groups

There were 60 minutes to discuss the following questions in the Break-Out-Groups. The results of the Group deliberations were presented in the concluding plenary session.

The questions that were put up to the participants:

1. Would you support the establishment of a community to develop and exchange knowledge on IAA?

2. Why would you support the establishment of a community to develop and exchange knowledge on IAA?

3. Who should have the lead for the Community? Business, Government, Knowledge institutions?

4. Could you specify the roles of each of these three actors in Egypt:
   a. Business
   b. Government
   c. Knowledge institutions?

5. What is required from the Dutch actors from:
   a. Business
   b. Government
   c. Knowledge institutions?

Annex 4 Break-Out Groups response to question 2, 4 and 5

Question 2:
Why would you support the establishment of a community to develop and exchange knowledge on IAA?

Private sector group	Government group	Research group
1. Two heads better than one	1. Share information and experience	1. We have experiences with aquaponics and IAA to share (NIOF)
2. Repository of information, advocacy and consultation	2. To avoid the risk when establishing a project	2. Technical developments are needed: we are at step one
3. Enhance food security	3. To economize on time	3. For organic/ healthy production, quality control
4. Learn from each other	4. More efficient use of water	4. Much brackish water available
	5. Better exchange of information, especially on training and establishing data bases	5. To maximise the use of water and land.
	6. Establishing of a good community, with the golden triangle	6. Water shortage in near future
	7. Exchanging experiences	7. Economic sustainability & food security
	8. Saving of efforts	8. To develop pilots into practical application
	9. Saving technology and experience	9. To share experiences and learn from each other
	10. Maximizing utilization of marginal resources	10. To develop aquaculture in marine area, esp. Red Sea
	11. Exchanging experience and start where others end	11. Brackish water system as alternative system beside freshwater & marine
	12. To start a national project and strategy	
	13. Establishing the community is the shortest way to reach integration	

Question 4.1:
Could you specify the roles of the Egyptian Private Sector in CDEK?

Private sector group	Government group	Research group
1. Do pilots	1. To explore most important investments	1. Funds
2. Spread results	2. To give opportunities to explore	2. Tries to solve the problems in collaboration with researchers.
3. Lobby at government	3. To explore the market	3. Business experience with trials & pilots
4. Innovation	4. Make best use of funds	4. Apprehension about business taking over the role of research (1 person)
	5. Capacity building and funding	5. Indicate research topics & problems to research institutes
	6. Financing for researchers	
	7. To spend money on research and development	
	8. Experience in risks, implementation power, financing	
	9. Financing and sharing management	
	10. Limited financing (< 45%)	
	11. Determining the activities that go to the market	

Question 4.2:
Could you specify the roles of the Egyptian Government in CDEK?

Private sector group	Government group	Research group
1. Legal framework	1. Controlling the private sector	1. Bring in environmental and social aspects (beside from economics)
2. Infrastructure	2. To clarify the policies	2. Facilitate research between knowledge institutes and private sector
3. Services	3. Sharing private sector in decisions	
	4. Defining needs of the market	
	5. Government to decide who to implement different projects	
	6. Is able to benefit from the existing resources	
	7. Coordination between private sector and institutional	
	8. Legislation and administrative framework, incentives, financing researchers	
	9. To identify priorities	
	10. Flexibility when cooperating with private sector and research	
	11. Planning	
	12. Long term vision	
	13. To cover risks	
	14. Facilitating getting the information	

Question 4.3:
Could you specify the roles of the Egyptian Research Institutes in CDEK?

Private sector group	Government group	Research group
1. Bring knowledge	1. More research and development projects	1. Looks for innovation/solution to problems proposed by business (which are shared with government support)
2. Contribute innovation	2. Realize applied projects	2. Share their knowledge
3. Technical support (f.i. IPM)	3. Capacity building	3. Guiding, producing ideas
	4. Coordination between researchers and priorities	4. Bring in innovations and new ideas
	5. Apply main objectives of projects	
	6. To define roles and goals	
	7. Make use of natural resources in research	
	8. To define the actual costs and maximal benefits out of the projects	
	9. Innovative solutions	
	10. Social and environmental impacts	
	11. Defining goals that have impact on the social outcome	
	12. To define appraisal and an evaluation of the pilots	
	13. Applied research	
	14. Partial evaluation for each step, defining the best technique	
	15. Advise government and private sector	

Question 5.1:
What is required from the Dutch Private sector in CDEK?

Private sector group	Government group	Research group
1. Know how	1. Know how	1. Aquaculture companies can share their experiences but needs adaptation to Egypt conditions
2. Flexibility: adjust solutions to local conditions	2. To facilitate fish farms in Holland, to evaluate global market	2. Training
3. Building local capacity	3. To pass knowledge	3. Best management practices
4. Training!!!!! (CSR)	4. Funding	4. Innovations, think tanks
5. Joint venture	5. Highest management system for such products	
6. Participate in pilot projects	6. To help to work with Egyptian government	
7. Contribute to policy advocacy (CSR)	7. Exchanging experiences with government and Ngo's	
	8. Sharing investments	
	9. Sharing knowledge	
	10. Needing experience of halophyte produce with good market perspectives	
	11. Long-term cooperation	

Question 5.2:
What is required from the Dutch Government in CDEK?

Private sector group	Government group	Research group
1. Match making	1. Money, funding	1. Facilitate contacts with Dutch companies based on Egyptian needs
2. Facilitating study tours (technical + regulatory framework)	2. Support Egyptian researchers	2. Facilitate contacts for training of Egyptian persons
3. Contribute to policy advocacy	3. Exchange of regulations	3. Decide points of common interests (NL – Egypt)
4. Project funding	4. Technical support	4. New methodology transfer
	5. Supporting the Egyptian projects	
	6. Join the projects	
	7. Support for coordination	
	8. Training	
	9. Financing and training	
	10. Management shared linked with long-term vision	

Question 5.3:
What is required from the Dutch Research Institutes in CDEK?

Private sector group	Government group	Research group
1. Introduce Dutch practice into Egypt	1. Exchange scientific visions	1. Share Dutch experiences & knowledge for solving Egyptian problems
2. Support Dutch innovation cycle in Egypt	2. Exchange genetic resources	
3. Do twin research with EGY research institutes + PS	3. To share in pioneering projects	
	4. Exchange of students	
	5. Knowledge exchange based on priorities	
	6. Technology, knowhow and equipment	
	7. Sharing experiments	
	8. Applying the best research projects in Egypt	
	9. Providing international dimension	
	10. Sharing experiments	
	11. Mutual experimental programmes	
	12. Protocols for intellectual property	
	13. Providing us with the successful projects	

Alterra Wageningen UR
P.O. Box 47
6700 AA Wageningen
The Netherlands
T +31 (0)317 48 07 00
www.wageningenUR.nl/en/alterra

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Alterra Wageningen UR is the research institute for our green living environment. We offer a combination of practical and scientific research in a multitude of disciplines related to the green world around us and the sustainable use of our living environment, such as flora and fauna, soil, water, the environment, geo-information and remote sensing, landscape and spatial planning, man and society.

The mission of Wageningen UR (University & Research centre) is 'To explore the potential of nature to improve the quality of life'. Within Wageningen UR, nine specialised research institutes of the DLO Foundation have joined forces with Wageningen University to help answer the most important questions in the domain of healthy food and living environment. With approximately 30 locations, 6,000 members of staff and 9,000 students, Wageningen UR is one of the leading organisations in its domain worldwide. The integral approach to problems and the cooperation between the various disciplines are at the heart of the unique Wageningen Approach.

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Alterra Wageningen UR
P.O. Box 47
6700 AA Wageningen
The Netherlands
T +31 (0) 317 48 07 00
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