Sharing Israeli Innovations for Global Sustainable Development

CINADCO
Center for International Agricultural Development Cooperation, Ministry of Agriculture and Rural Development

MASHAV
Israel’s Agency for International Development Cooperation
Ministry of Foreign Affairs
Sixth of the human race, 1.2 billion people, live in extreme poverty, defined by the UN as having an income of less than one dollar a day. More than 300 million of these people live in Africa, where they make up almost half the total population.

People living in extreme poverty suffer from hunger, lack of safe drinking water and proper sanitation, poor medical care and chronic unemployment. Development is a global issue requiring immense attention, resources, and political efforts by the international community’s many forums such as the United Nations, ECOSOC, the OECD, as well as multilateral development banks, NGOs, international development agencies, and philanthropic foundations.

Founded in late 1957, MASHAV – Israel’s Agency for International Development Cooperation – is responsible for the design, coordination and implementation of the State of Israel’s development cooperation programs. Since its inception, over 270,000 professionals from around the world have participated in MASHAV’s professional programs.

Guided by the Millennium Development Goals (MDGs), adopted by the UN General Assembly, MASHAV’s approach is to ensure sustainable development taking into consideration social, economic and environmental issues, thus taking part in the international community’s commitment to achieve Goal #1: Halve poverty and hunger by the year 2015.

MASHAV’s activities focus primarily on areas in which Israel has a competitive advantage, including agriculture and rural development; water resources management; micro-enterprise development; community development; medicine and public health, empowerment of women and education. At the same time MASHAV operates according to the needs and demands originating from the partner countries, as opposed to a supply initiated by Israel that might not be relevant or effective elsewhere. Programs are based on a “train the trainers” approach to institutional and human capacity building, with professional programs conducted in Israel and in situ. Project development is supported by the seconding of short and long-term experts, as well as on-site interventions.

In its programs and philosophy, MASHAV adheres to the accepted international principles as stated, among others, in the Earth Summit in Rio de Janeiro, the Johannesburg Summit on Sustainable Development, the Monterrey Consensus, the Paris Declaration on Aid Effectiveness, the Accra Agenda for Action, the Doha Conference on Financing for Development, and the Busan Partnership for Effective Development Cooperation.

Since its establishment, MASHAV has promoted the centrality of human resource enrichment and institutional capacity building in the development process – an approach which has attained global consensus.
Israel's own development experience enables it to design comprehensive and integrative programs for both urban and rural settings, which are of critical concern to developing countries. In order to broaden the impact and efficacy of our programs MASHAV cooperates with sister agencies, international and UN development agencies, and with relevant government ministries and governmental organizations. All professional programs and models are adapted to regional, national and local development strategies. Additional details are readily available upon request.

MASHAV's agricultural and rural development programming deals with the introduction of relevant and adaptable modern technologies and agro-technical methods designed to increase the levels, sustainability and quality of agricultural production to ensure food security. It also concentrates on introducing effective support systems to enhance the economic viability of agriculture in areas such as marketing, storage and transport, the supply of agricultural inputs, granting of credit and finance to the agricultural sector and upgrading the work of extension services.

There is no other way to attain basic food security and sustainability other than promoting and engaging countries in the enhancement of their primary sector – agriculture – taking into consideration the whole production chain including basic food crop production, food storage and post-harvest care. MASHAV's approach to agricultural development is based on harnessing science, technology and extension. Applied research, the introduction of innovative technologies and the promotion of agricultural crop intensification and diversification are key elements in attaining food security.

The challenge is to adapt in developing countries many of the known improvements in the use of agricultural practices and technologies such as fertilizer application, crop production and protection methods, and make them more accessible and adjustable to the circumstances and the needs of the smallholder farmer in rural areas.

MASHAV's main professional and operational affiliate for international agricultural and rural development cooperation is CINADCO – the Center for International Agricultural Development Cooperation of Israel's Ministry of Agriculture and Rural Development.

CINADCO's activities focus on key issues and topics of the global agenda to enhance agricultural development, improve food supply, and employment and economic growth in developing countries. The professional hallmark of CINADCO's activities is based on Israel's own agricultural and rural development experience, to develop the agricultural and rural sectors under semi-arid and arid climatic conditions and management of limited natural production resources together with the integration of appropriate agro-technologies, water and irrigation, R&D, and agricultural extension.

Throughout the years Israel has developed unique expertise and approaches to agricultural development. Following are professional papers representing some of those key areas that are critical to mitigating poverty and hunger and attaining food security in developing countries.
Despite the remarkable progress made in increasing food production worldwide, approximately half of the population in developing countries does not have access to adequate food supplies; thus the food security problem is worsening. There are many reasons for this, one of which is food losses occurring throughout the supply chain from production, post-harvest, processing and marketing.

In the recent report “Global Food Losses and Food Waste” (FAO, Rome, 2011) statistics show that roughly one-third of food production for human consumption is lost or wasted globally, which amounts of about 1.3 billion tons per year. “Loss” means any change in the quality of the food that prevents it from being consumed. Causes of this loss are varied with microbiological, mechanical and physiological factors being the main cause in perishable crops. Other causes are poor harvesting procedures and packaging, incorrect handling and temperature control, as well as inadequate transportation. These are areas where major losses occur in developing countries. In developed countries losses occur at the point of marketing, with supermarkets being responsible for much of the losses.

According to recent study by the FAO/World Bank food losses contribute to high food prices. They also have negative environmental impacts as land, water and non-renewable resources such as fertilizer and energy are used to produce, process, handle and transport food that no one consumes.

Post-harvest Handling of Fresh Commodities addresses points during the marketing chain where losses occur, and describes solutions to potential problems. There is a wide range of post-harvest technologies used in Israel that can be adopted to reduce losses throughout the process from field to fork. Israeli experts develop and adapt the tools required for the successful application of selected technologies in accordance with the local systems and needs. The transfer of postharvest technologies includes explanation of the physiological, pathological and
environmental factors involved in the deterioration of fresh agricultural produce.

The objectives of our post-harvest specialists are to facilitate post-harvest technologies and best practices associated with the post-harvest handling of fresh fruits and vegetables, to assist in the delay of senescence, to reduce loss and to maintain the best possible quality of the produce. The final aim is to initiate, teach and transfer knowledge to extension workers and farmers. Special emphasis is given to important local commodities and their problems.

All of the subjects mentioned below are areas in which Israeli scientists are active both in increasing the knowledge base and in developing efficient and sustainable methods to maintain postharvest quality. Therefore, the Israeli experts are equipped with the latest developments in the field. The post-harvest know-how and technologies introduced by CINADCO equips developing communities with the practical and professional means to better exploit the agricultural and natural resources and reduce food losses and hence improve sustainable food supply and alleviate hunger and poverty.

Main subjects include:

- Post-harvest physiology; changes occurring in fresh produce after harvest, climacteric and non-climacteric fruit, ripening, and senescence. Ethylene and its control and uses.
- Pre-harvest factors and how they can affect post-harvest quality of fresh commodities.
- Harvest procedures and how to determine the optimum harvest time for a commodity.
- Standardization and inspection of fresh produce and how to determine quality factors.
- Post-harvest temperature treatment and humidity control and what can be done if refrigeration is not available.
- Storage methods including controlled and modified atmosphere.
- Packinghouse operations from simple packinghouses to modern complexes.
- Packaging and its importance.
- Sanitation and food safety; both human and plant pathogens and how to prevent their entrance into the post-harvest marketing chain.
- Post-harvest pathology; fungal and bacterial pathogens and methods of both prevention and control.
- Physiological causes of post-harvest losses; temperature induced, stress induced, ethylene induced, handling induced. Methods to minimize losses.
- Post-harvest protocols for specific fruits and vegetables (and flowers if requested). Generally a demonstration experiment is set up to show the benefit of a protocol.

Investing in post-harvest technologies to reduce food losses could significantly increase the food supply in developing countries. As FAO Assistant Director-General Maria Helena Semedo stated, “if we agree that sustainable agricultural systems need to be developed to feed 9 billion people by 2050, addressing waste across the entire food chain must be a critical pillar of future national food strategies.”

Drip irrigation: 
A Remarkable Way to Irrigate Plants and a Solution to Crop Cultivation in an Era of Global Warming

Dr. Mollie M. Sacks and Asher Azenkot

“I looked at my father and looked at those dry fields [in Malawi]. It was the future I couldn’t accept.”
William Kamkwamba

One of the biggest challenges facing mankind is climate change. Most climate experts expect global warming to create a non-stable and unexpected climate behavior resulting in higher frequencies of droughts and extreme storms. As a result, we can anticipate water supply instability and shortages in the near future. Several billion people will be affected by global warming via food shortages.

According to the recent SOLAW publication by the FAO1: “The challenge of providing sufficient food for an ever-hungrier planet has never been greater, especially in developing countries, where quality land, soil nutrients and water are least abundant.” The report highlights that “some production systems are put at risk of breakdown of productive capacity. The consequences in terms of hunger and poverty are unacceptable.” The report remarks that “worldwide, the poorest have the least access to land and water and are locked in a poverty trap of small farms with poor quality soils and high vulnerability to land degradation and climactic uncertainty. Improving the efficiency of water use by agriculture will be the key.” SOLAW recommends “a combination of improved irrigation schemes management, investment in local knowledge and modern technology, knowledge development and training.”

How do we tackle this problem? What will be the costs and benefits of our solutions? One of the solutions is managing the responses of crops to changes in climate, diseases, and atmospheric conditions by drip irrigation.

Traditional irrigation uses a considerable amount of water per unit area and small quantities of water are almost impossible to apply. In Israel, new approaches to irrigation have been developed due to the scarcity of water, lack of ties...
to traditional forms of irrigation, and the need to transform barren desert soil into highly productive cultivated land. In Israel, commercial production of drip irrigation is continuously advancing in order to create drippers that are resistant to clogging and allow the farmer to obtain higher yields for all crops with less water.

The knowledge and experience accumulated in Israel is applied through MASHAV/CINADCO for the benefit of farmers in the developing world. Promoting drip irrigation as a new concept assures the production of food under water shortage condition and in small plots. For farmers struggling with scarce resources the technology helps to promote yields and hence food security and poverty eradication. The beneficiaries are primarily smallholder farmers who are the main producers of food in many developing countries.

Drip irrigation systems, which use valves, filters, pipes and drippers, supply water, drop by drop, directly to the plant’s roots, to alleviate the effects of drought. With drip irrigation, each plant is planted in close proximity to the dripper. Water never becomes a limiting factor, and if nutrients are supplied along with the water, drip irrigation increases yields while wetting only a fraction of the soil surface. Large increases in crop production are guaranteed when water and nutrient availability in the root zone are at optimum levels. Precise, high-frequency, low-volume irrigation reduces the dangers of waterlogging and salination and also creates favorable moisture conditions even in problematic soils (e.g., coarse sandy or gravelly soils) and terrains (hilly areas) that had previously been considered too hard to cultivate.

The heart of this technology is the dripper, which gives a constant and precise amount of water (0.6 l/h – 8 l/h) under pressure. This is a closed system in which pressure builds up along the lines, unlike irrigation in open channels where water is diverted from rivers via channels to level beds located in valleys. The drip system can be scaled down to any size of field or plot and operated at low pressures, even 1 to 2 meters obtained by raising a small reservoir (250 to 500 liters) onto a table. This way of using the drippers is called the “Family Gravity System” because no source of outside energy is needed once the reservoir is filled, thus eliminating the need for a pump.

Marginal, saline and treated wastewater can be used as the water source, providing the water is passed through filters to remove irregularly shaped particles to prevent clogging of emitters (by suspended particles, organic matter, or precipitating salts). This is possible because the pattern of soil wetting underneath the dripper moves the excess salts to the margins of the wetted area, thus maintaining optimal conditions for root growth and nutrient uptake in the wetted zone.

Drip irrigation is a concept of supplying frequent small amounts of water and fertilizer to the crop. This method greatly enhances the water use per unit of production (i.e., crop yield), termed “water use efficiency”. It is the major method of irrigation in Israel for all vegetables, flowers, orchards, vineyards and citrus groves. This irrigation method allows one to successfully grow crops in the off season, when there is limited precipitation and when the rainfall is not predictable due to climate change. It is an irrigation method that can be used worldwide and in greenhouse cultivation, while preventing nutrient contamination of water sources and ground water. Properly used, it saves water for the planet, and can help to solve the effects of global warming on food production. The benefits of drip irrigation far outweigh the costs of this unassuminlly brilliant technology.

The dramatic dynamic change in the world’s meat and milk consumption will become evident in the next 10 years. The magnitude of change, however, will differ between developed and developing countries.

Over the last 24 years, the total world milk production has increased by 32%, but milk production per capita has declined by 9%. This means that the increase in world milk production is not in line with the increase in world population. The decline in global milk production per capita can be attributed to falling production in developed countries, even though there has been a slight increase in developing countries.

This revolutionary trend has been most evident in East Asia, China, India, Brazil and sub-Saharan Africa. The increase of dairy products is evident in the big cities and this trend will continue further due to the mass migration from rural areas to big cities. This is in contrast to the developed countries, where per-capita milk consumption has stagnated due to a saturation of the level of consumption and a small population increase.

The rate increase in milk production in developing countries lags behind the increase in local consumption, therefore contributing to an increase in milk imports from developed countries.

The transporting of milk from one continent to another is limited due to the large volume of milk. The only way to transport it is in powder form. However, the conversion of milk to powder and its reconstitution as milk is not a cost-effective process. We can conclude, therefore, that milk should be produced locally by increasing milk production. The problem is that many developing countries lack the knowledge and technologies to do so.

Israel has developed a comprehensive system that is being adapted and implemented in developing countries, including the production of milk under heat stress conditions.
Milk ing and management technologies have been developed in Israel, enabling users to receive online information about every cow during milking and throughout the day. Israel has brought feeding to a sophisticated level, giving the cow the most appropriate food, served as total feed ration with the lowest cost by using by-products from the food industry.

The intensification also includes the construction of “envelope” organizations, owned by the farmers themselves, which provide services to the farmers at cost price, such as artificial insemination, veterinarian services, udder health, herd book, central feeding centers, and more.

Due to its harsh climate conditions, Israel has also developed a comprehensive procedure to effectively cool the cows during the hot season in both waiting yards (adjacent to milking parlors and adjacent to barns in the case of large herds) and within the barns.

Israel, through its Ministries of Agricultural and Rural Development and of the Environment, has published a regulation which requires all dairy farm owners to prevent the contamination of the environment. For more than eight years, Israel has subsidized all the farms in order to meet those requirements and to improve welfare conditions by reconstructing the barns according to recommendations agreed by the Israeli Extension Service (SHAHAM).

As a result of the regulation, new barn designs have been developed. These designs allow the farmers to pullback the roofs of the milking cows’ barns, thus presenting a solution to the ban on open yards.

Israeli farmers are also required to treat manure in original bio-gas and compost plants as well as constructing systems to enable the storage of manure, spreading it onto the fields only in non-rainy seasons. This does not apply to areas with high hydrological risk, where there is an absolute ban on spreading manure.

Today all farms have made the necessary investment to fully adopt and apply the above regulations. The Israeli system is based on production with high economic effectiveness by using high-tech systems and working under full integration of all organizations mentioned above.

The Israeli dairy husbandry model can be adapted to meet the challenges faced by developing countries. An excellent example can be found in the establishment of the Yongledian Dairy Cattle Demonstration farm near Beijing, China, where the latest Israeli designs, technologies and expertise are applied on its herd. This adaptation has raised milk production to the highest in China. The farm serves as a training center for thousands of dairy producers from China and neighboring countries as well.
Advanced Grain Storage Methods
for Quality Preservation and Insect Control Based on Aerated or Hermetic Storage and IPM

Prof. Shlomo Navarro and Prof. Simcha Finkelman

Grain is a sensitive product attacked by biological agents such as insects, mites, and fungi. In addition, oxidative processes reduce its quality and flavor during handling and storage. These biological agents cause direct losses, insect and mite contamination, filth, discoloration, loss of flavor, and presence of dangerous mycotoxins in grain. Insects can also create conditions for fungal development and are one of the main vectors of their dispersion. Insect activity can cause allergen reactions in workers and consumers. After harvest, grain is permanently at risk of insect infestation and consequently, the grain storage and processing industries systematically use chemical control methods.

The reduction of grain losses and preservation of its quality during storage has become a global challenge. Developing countries are most vulnerable to grain losses and quality deterioration during storage. According to Jamal Saghir, Director of the Sustainable Development Department, World Bank Africa Region, “reducing food losses is increasingly recognized as part of an integrated approach to realizing agriculture’s full potential, along with making effective use of today’s crops, improving productivity on existing farmland, and sustainably bringing additional acreage into production.” Promoting advanced storage methods is the first priority. Introducing advanced and efficient grain storage methods guarantees sustainable food autonomy in countries where it is most needed and reduces the dependency on urgent food aid.

Additional challenges are to replace conventional chemical treatments that affect global warming, and to develop technologies based on the integration of environmentally sound and sustainable methods. These technologies are needed for the protection of quality of grain at different phases of postharvest handling and storage to meet international standards.

Sharing and implementing the Israeli knowledge and the advanced technologies described below in developing nations is an efficient measure toward sustainable eradication of the misery of hunger and breaking the vicious cycle of poverty. These technologies were developed in Israel some are registered as international patents by Israeli researchers.
Environmentally User Friendly Insect Control Methods

**Aeration systems:** Aeration is a widely used method for the preservation of stored grain. It is used to modify the grain bulk microclimate and to render it unfavorable for the development of damaging organisms in the grain, and at the same time create favorable conditions for the sustained preservation of grain quality. Forced aeration is an effectively applied method in commercial-scale bulk storage of grain. Refrigerated aeration has been used for cooling dry grain in subtropical climates when ambient temperatures are too high for successful insect control by aeration with untreated air\(^1\).

**Modified Atmospheres (MAs):** For cereal grain stored in bags or in bulk, a new gaseous application technology that has successfully replaced fumigants is the manipulation of modified atmospheres (MAs) using biogenerated MAs, for insect control and for quality preservation of dry cereal grains and high-moisture corn. These niche applications of MAs have resulted in very promising treatments with market acceptability.

**Hermetic Storage:** A type of Modified Atmospheres that can be applied for the protection of grain is “hermetic storage”. Hermetic storage in flexible plastic storage systems, under subtropical and tropical climatic conditions continues to offer an excellent solution, provided there is a certain degree of tolerance to the presence of live insects at critical places in the storage structure. With recent improvements in materials and construction of flexible, nonporous bags and liners, a variety of size options offer protection for products from 25 to 1,000 kg up to 10,000-15,000 tones (Navarro 2010)\(^2\). Commodities including cereals, oilseed grains, pulses, cocoa and coffee can be stored safely for many months, maintaining high quality and limiting molds and mycotoxins. Plastic structures suitable for long-term storage systems, as well as intermediate storage of grain in bags or in bulk have been developed and applied.

**Thermal Disinfestation technique:** The technique is used in flour mills and food processing facilities by applying high target temperatures ranging from 54°C to 60°C to kill insects in stored product by inducing dehydration and/or protein coagulation or enzyme destruction.

**Monitoring Pests with Attractants**

**Pheromone Lures and traps:** A variety of traps baited with synthetic pheromones has been developed for use in monitoring programs in food processing and storage facilities. The slow-release of pheromone from lures is achieved by incorporating the compound into a plastic matrix from which it is slowly released during several weeks or months. A new approach to the use of pheromones is the monitoring of insects based on remote sensing electronic transmitters that are progressively integrated into control programs.

**Grain probe traps:** Grain probe traps or pitfall-cone traps, placed at or below the surface of grain masses do not require the use of pheromones. These traps capture beetles that are simply crawling through the holes of the probe shaft, causing them to drop through the void inside the probe and directing them by a funnel into a collection vial. They are important tools in detecting the presence of beetle populations in grain masses at densities lower than those that can be detected by regular sampling of the grain and examining it for their presence.

**IPM in the grain Industry:** An IPM program that might integrate insect monitoring, aeration in winter, chilling with refrigerated air in summer in grain silos, biogenerated MAs for insect control and for quality preservation of grain, and assisted MAs during storage of grain and at the final stages of the processed grain before packaging is proposed.

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Ms. Nina Lehmann

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The State of Israel has closed the gap from being a developing country in the 1950s to becoming a member of the OECD, despite difficult climatic conditions, scarce land, shortage of water and other national challenges.

We attribute the achievements mainly to the close collaboration and interaction between agricultural research, extension service and growers, resulting in the promotion of advanced technologies in all agricultural sectors.

A participatory approach to development includes a process of equitable and active involvement of all stakeholders in the formulation of development policies and strategies and in the analysis, planning, implementation, monitoring and evaluation of development activities. Following this approach, Israeli agricultural extension is a governmental framework at the service of farmers. It constitutes a link between research and the growers, aiming to improve farmers’ agricultural practices.

The following organizations cooperate to promote Israel’s agriculture:

**SHAHAM – The Israeli Agricultural Extension Service, Ministry of Agriculture and Rural Development**

The Agricultural Extension Service is a government advisory unit; it provides high-quality advisory services with focus on applicable know-how to the farmers. SHAHAM’s objectives are to serve:

1) **National policy:** Land settlement, population dispersal, food supply and protection of the environment.
2) **Farmer welfare:** Standard of living, efficient production and profitability.
3) **Consumer welfare:** Safe and nutritious food, year-round supply at reasonable prices.

The extension service pursues an active working collaboration with farmers’ associations, commodity production, marketing boards and research institutions.
**ARO - The Israeli Agricultural Research Organization, Ministry of Agriculture and Rural Development**

ARO is the research arm of the Ministry of Agriculture. It is responsible for planning and conducting Israel’s agricultural research efforts. Together with the Hebrew University’s Faculty of Agriculture, ARO deals with solving current problems in agricultural production as well as introduction of new products, processes and technology.

**Regional Research & Development Stations**

Ten R&D stations have been established in Israel to serve the development needs of the agricultural regions. Partners in the research activities are ARO, Extension Service, universities in Israel and other research entities. Their management board includes representatives from research organization, the extension service, farmers and other stakeholders. R&D is one of the important means available for Israeli agriculture to fulfill its goals and help cope with its challenges. Research, field trials, model farms and other means are set up for R&D in Israel.

**Growers**

Growers are part of the management of each agricultural branch. Management also includes researchers and extension service experts who outline the objectives and development priorities of each branch.

**Collaboration Map**

Extension services constitute a bridge to facilitate the transfer of agricultural research and innovative techniques to the farmer. In so doing, the productivity and efficiency of the farmers is increased, thereby further contributing to the attainment of food security, sustainable development and poverty eradication.
Aquaculture

Dr. Isaak Bejerano and Ofer Sachs

The world’s supply of fish from natural habitats is being depleted, and the quality of marine ecological systems throughout the world is declining, except in a few places where environmental awareness is more evident and strict enforcement is applied. In order to supply the constantly growing demand, the branch of aquaculture has been developing at a rapid rate over the past few years.

There are a number of natural causes that can bring about the deterioration of water quality, for instance the growth of algae, invasion of non-endemic species, or changing quantities of sediment. But man-made factors, including unsuccessful developmental strategies, have caused, and still cause, some of the gravest damage to marine ecological systems, hastening their deterioration to the extent that all life in the water is threatened.

The world’s lakes and seas are closely connected to the daily life of the communities that surround them. Many lakes were and still are the only source of livelihood and of communities which depend mainly on fishing. Non-sustainable use of soil, nonexistent development, and the desire for quick profits are some of the reasons for the widespread deterioration. In many cases unplanned development critically affected the communities living in the area of the water, severely damaging their quality of life, nutrition and food security.

The development of aquaculture in the developing world is expected to lessen the effects of over-fishing and the damage to natural resources, as well as improving food security and safety for the populations described above.

Real and effective changes can be made using relatively simple tools that can provide food and income on the one hand, while preserving natural resources for future generations on the other. However, rapid development poses risks that have to be taken into account during the program’s implementation. The communities of fishermen, fish breeders and farmers or settlers with access to water sources, and those who want to breed fish, are the main target populations for MASHAV/CINADCO development assistance activities in the field of mariculture.

When implementing such development programs, there is a need to adjust them to the nature of the future production scheme. Fish producers and breeders are therefore categorized according to their size, the scope of production, the type of fish and marketing aims.

Dr. Bejerano is a Microbiologist and Water Quality Scientist.

Mr. Ofer Sachs is the Director of CINADCO, the Center for International Agricultural Development Cooperation, Israel’s Ministry of Agriculture and Rural Development.
The basic framework is the family with a pond or two in the yard. This traditional way of fish breeding is intended to meet the needs of a family, while providing a small surplus for local marketing. Larger frameworks relate to larger fish farms, which are either government or privately owned.

Those involved in fish farms require professional, practical and theoretical knowledge at all levels of operation, from fish breeding to farm planning up to the management level including product care and marketing.

Israel’s Relative Advantage

MASHAV and CINADCO have been working for many years in the field of agricultural assistance to the developing world, based on the accumulated experience of 70 years of fish breeding in Israel. Israel’s know-how and experience are uniquely valuable and meaningful for developing countries, some of which face a lack of natural resources or arid or semi-arid conditions.

In the field of aquaculture, Israel has achieved impressive results that have made it a leader in certain areas that are at the heart of development cooperation:

- Fish breeding – diversified technologies for production of different fish species, under changing intensification conditions (ponds, cages and recirculating systems).
- Planning and management of a farm – structural principles of fishponds, kinds of facilities and equipment for fish breeding. Data collection and registration.
- Water quality – water as a medium for life, limnology of fishponds. Importance of water quality for fish breeding. Health aspects of fish, dependent on water quality. Adaptation of fish breeds to different water qualities (salinity, temperature, etc.).
- Fish and marine animals – morphology and anatomy. Fish breeds in aquaculture, biological aspects of different breeds, types of interface according to fish species.
- Fish health – causes of disease, diagnosis and treatment, prevention interface.
- Feeding and nutrition – principles of fish nutrition. Feed production for different fish species (use of raw materials).
- Fish propagation – production of fingerlings, naturally or induced, with hormonal control. Production of mono-sex population. Planning and maintenance of breeding schools.
- Unionization and cooperative organizations for fish production and marketing.

Feasibility analysis and economical consideration – cost and production aspects for establishment and continuous maintenance.

These professional programs are offered at different levels, from basic material intended for the domestic fish grower, to the academic institutions dealing with aquaculture. The programs are designed to take into consideration the available manpower and the physical conditions existing at the site while taking care not to disrupt the existing traditional labor frameworks.

MASHAV/CINADCO’s programs include:

- Support and professional advancement for workers in the existing fish breeding farms – the support is given to groups of fish growers, professional workers employed on fish farms and to those who wish to enter the field.
- Assistance in developing aquaculture – development in areas with the potential for fish production, in those areas where fish are not yet being raised.
- Assistance in areas that have undergone ecological changes – adjusting the programs in accordance with changes that might include changes in water quality, the environment and the kinds of fish, training agriculturalists for the conditions that have been created.
- Training and professional accompaniment for service branches on fish farms – as in all agricultural fields, it is possible to train skilled manpower, who will be capable of training and administering health services to small and large farms at the local and regional level.
- Support in planning, establishing and operation of service units – fish breeding institutes, service laboratories to identify water quality and implementing health examinations for the fish.