

LOOKING BACK AT A FISHY CENTURY

(Abridged version "From motorisation to conservation" was published as M.Ben-Yami's column in World Fishing, December 1999).

The 20th century is expiring in front of our eyes along with the 2nd Millennium. Those of us who were involved in World War 2 would hardly believe that they live to see what they see at the dawn of the 21st. But, with one month to go, it's as a good opportunity as any to glance at the diverse and often troubled fishing history of the last 100 years, during which the industry underwent more than one revolutionary change, and in more than one sense.

Motorisation. It began with mushrooming vessels motorisation in Europe, Japan, and N.America, steam and diesel engines replacing sail power. In an FAO paper, David Thomson of Scotland wrote that during the first half of the century fish markets were extremely species and size selective, which forced most commercial fishermen to apply selective, single-purpose gear and methods in single-purpose vessels. The nearest thing to a multi-purpose fishery was trawling, but even so only a handful of bottom species could find high-demand on European and North American markets. In the North Atlantic, only 2 species really mattered: cod and herring. With a few exceptions, such as the North Atlantic banks, most of the fishing was done in coastal waters.

Fishing was long considered trade that, apart from navigational skill, requires only artisan's, traditional knowledge. But fast modernization of fisheries and the growing size of fishing vessels required also specially trained personnel. Already in the second quarter of the century Japan and Russia recognized the importance of establishment of modern fishery industry and founded fishing schools and colleges. Later, especially after WW2, other countries, followed suit.

Post-war expansion. After World War 2 things have dramatically changed. The world, starved for animal-protein, welcomed new technologies that offered new options to the industry. Fishermen adapted some of those, such as hydro-acoustics and radar, from the naval inventory. Synthetic fibres, outboard engines, extensive power range of diesels, mechanically and hydraulically powered winches, and net and line haulers provided both small and larger scale fisheries with additional efficiency, security of operation, and improvement of working conditions.

Concurrently, came mechanical refrigeration and freezing, midwater trawling, application of synthetics in construction of fishing gear, ever larger fishing vessels and, following the first stern-trawlers, the British "Fairfree" and "Fairtry", hundreds of giant factory trawlers were built at a grandiose scale most of them for Soviet-Block fishing fleets.

Reality frustrated quite a few technological hopes that soared high after WW2. Such were, for example, atomic reactors on the bottom of the sea creating artificial upwelling enriching nutrient-exhausted upper layers, electric fishing in sea water, automated fishing with pumps, light, and electric current, trawlnets towed by pairs of remote-controlled unmanned submarines, fishing with sound attraction, adaptation of the Magnus' rotor effect in trawls to replace trawl boards, and massive fisheries of mesopelagic fishes and krill. On the other hand, hydro-acoustics fish-finding and gear-monitoring equipment was fast improving. In the 3rd quarter of the century it integrated computer technology, thus achieving amazing degree of resolution and data interpretation.

Exclusive Economic Zones. The cod war between Iceland and Britain paved the way for the international acceptance of the 200-mile wide EEZ, which gave all coastal nations nominal control over their fishery resources. Some of them have been able to assume such control, others - not yet, or partly only. The declaration of EEZ hit many European distant-water operations and their fishing ports later combined with the downfall of the centrally controlled economies to bring about the collapse of their mammoth fleets of factory ships.

The second half and, especially, the fourth quarter of the 20th century have witnessed many technological and economic developments which together with swelling fish markets have supported the explosion, superseiners, freezer-trawlers, giant midwater trawlnets, autolining, out-growing tuna in cages, first attempts at krill industry, and research and production of artificial bait and light lures. Far Eastern markets developed to attract huge amounts of fish and promoted, for better or worse, production of high-value sashimi tuna, shark fins, and marine crustaceans, mollusks, and sea cucumbers. Also in Europe and N.America constantly growing fish markets became the driving force behind investments in salmon, shrimp, gilthead bream, and bass farms, and in fishing fleets. All this led eventually to over-capacity.

Contradictory processes. Meanwhile, marine fish production from the wild has grown fivefold since World War 2, ranging in recent years around 90M MT. Certain fisheries still keep growing, but at a decelerating rate, while many stocks have been overfished and more – exploited to their utmost. Aquaculture on land keeps expanding, and together with the mushrooming marine farming just approached a fifth of the world's fish yield.

The world's population is incessantly growing and so is the demand for marine protein. But the marine fish stocks are finite, though fluctuating with various environmental and anthropogenic factors, and there's little prospect for much growth of yields. Aquaculture bears more promise, in spite of such constraints as high production costs, availability of fodder of marine origin, and various environmental problems.

But another consequence of this growth of human population, was accelerating urbanization, industrialization, and farming intensification, which resulted in increasing pollution of marine ecosystems. In extreme cases, man-caused pollution streaming

down rivers may end in disasters, such as the collapse of the Black Sea fishery ecosystem of late 1980s and early 1990s. Major engineering works, like up-stream dams, coastal structures, and shrimp farming ponds that replaced extensive mangrove areas, affected to various degrees inshore and offshore fish habitats and nursery areas.

Environmental issues

Concurrently evolved powerful environmental movement in the form of a rather amorphous cluster of green organizations directed its conservationist efforts at marine environment, in general, and fisheries in particular, with mixed intentions and results. Of major importance has been "Greenpeace"'s contribution to improved management and revival of whale populations. Green ideologies range from a credible desire for sustainable fisheries to lunatic pleas to save all marine organisms. Green activities affected fisheries in several ways, starting with enforcing turtle-escape devices in shrimp trawlnets, through total banning of "setting on dolphins" in the E.Pacific tuna purse-seine fishery, and ending with building up of unprecedented populations of certain fish-eating marine mammals that brought about the need for culling of some of their populations. Much less effective, however, has been the impact of the environmental movement on marine and upstream pollution. Critical observers are claiming that one reason for this partial default is the participation of some major polluters in foundations that finance green organizations. Others allege that some environmentalists prefer to focus on commercial fisheries, while ignoring recreational ones, which may be a product of an intense competition for resources with the increasingly powerful sport fishing lobby. Also commercial fisheries keep competing with each other, especially small-scale versus large-scale fisheries over inshore and coastal fishing grounds.

Technology. The advancing technology made today's fishing vessels into powerful fishing machines. Nevertheless, on many fishing grounds they are catching less fish per investment dollar and per fuel unit than their weaker predecessors were catching decades ago. The technology that perfected fish capture, navigation, handling and processing, failed to provide the gear selectivity needed to minimise the impact on fishery ecosystems and prevent unneeded bycatch. Focusing mainly on where the money was, it contributed rather towards the exhaustion of fish stocks than towards maximizing their protection and sustainable utilisation.

This century saw many people who brought about great technological changes, among them, a Russian engineer F.I.Baranov, and Japanese scientists M.Tauti, and T.Terada, who pioneered the science of fishing technology, Vigneron and Dahl the French fishermen who put sweeps between trawlnets and trawlboards, Matrosov - oval, slotted trawlboards; Mario Puretic - inventor of power block, and P.G.Schmidt of MARCO who influenced purse-seine fisheries all over the world; Simonsen, the Norwegian WW2 resistance radio-operator who founded SIMRAD the pioneer in fishing sonars, Hilmar Kristjonsson and J.O.Traung of FAO who made fishing gear technology and fishing boats architecture into internationally recognized engineering disciplines, the German fishing technologist J.Schaerfe, later of FAO, invented remote-controlled trawl-mouth monitor, Arthur Heighway the journalist from NZ who founded both Fishing News

International and Fishing News Books which since the 1950s was the leading publishing house of books on fisheries and fishery sciences, including many FAO fishing manuals, P.G.Borisov introduced fishing with underwater light attraction to the Russian Caspian and Black Sea sprat and horse mackerel fisheries. P.Klust of Germany and J.Reuter of Holland introduced testing standards for fishing ropes and twines. F.Sueberkrub, a German naval architect invented in 1950s the Suebercrub doors - a breakthrough in midwater trawling, and A.L.Fridman of the Kaliningrad Technical University developed scientific methodology for fishing gear design.

Fish population dynamics models. F.I.Baranov also fathered fishery modelling, but these were two British scientists, Ray Beverton and Sydney Holt, M.B.Schaefer, an American, W.E.Ricker of Canada, and several others, who developed the earlier mathematical models of F.I.Baranov and E.Russel into working models of fished populations. During the 1950s and 1960s these models were eagerly and enthusiastically adopted by fishery biologists, and soon became the main tool used to assess fish stocks, calculate permissible yields, and advise fishery managers on TACs, catch quotas, and other steps. In the 1980s, Daniel Pauly produced an adaptation for tropical multi-species fisheries. Many fisheries became regulated. Riding piggy-back on these models that soon became "bio-economic", Fridmanian and Thatcherian economists came up with the thesis that stocks can only be sustainably exploited if they become a subject to free market forces through individual tradable quotas or other privatisation options.

In the late 1970s and 1980s, however, this management methodology came under a growing criticism by both, social scientists and ecologists. "It ignores fishing people and their communities, and does not take into account the social costs which may exceed the financial profits that may be shown by fishing companies, and does not produce true social and national benefits" - said the former. "Stock assessment models ignore inter-specific oscillations and environmental influences on fish populations, as if their dynamics depend solely on fishing"- said the latter. Critics included scientists, as John Caddy and Serge Garcia, biologists of FAO, Russ McGoodwin, an American socio-anthropologist, Gary Sharp, a fishery bio-oceanographer, Parzival Copes, an economist, and many people from the fishing industry and environmentalist organizations. Even the late Ray Beverton, one of the founding fathers of the model-based management, in his swan song lecture at the 1992 World Fisheries Congress in Athens, spelled out their inadequacies and warned against misuse of the models.

Ecosystem. So, during the last decade of the 20th century the concept of eco-system management came into being. Not that, at this time, we know how to go about it, but we now understand that fish and fishermen are only two of the many elements of large and very complex and dynamic, ever changing and pulsating eco-systems. We now know that the widely used models are too simplistic. They may and may not give us the right idea on stock size, allowable catch, and sustainable yields. Mostly not, for Nature is humbling us constantly. The latest surprise: off Newfoundland where cod disappeared, the fishery industry has been compensated by huge catches of crustaceans. The catch

value has reached record highs, although the benefits from fishery shifted to different people.

This was a stormy, horrible, and wondrous century. It carried the fishing industry from a world of steam engine into one of nuclear power, electronics, and cyber-space. But it dragged the humanity through 2 horrible wars and the greatest mass killings in the history, including Holocaust – an industrialized genocide. It brought prosperity to some, longer life expectation to many, but left many more below reasonable life standards. For the fisheries industry this was a century of headlong expansion and tumultuous modernization, possibly too fast and too much for its own good. Most recently, however, a new trend appeared, a trend of rational, national and international management of the various fisheries and their natural resources.