

Interview

E.G. Silas: A Phenomenon in Fisheries Arena*Reminisces over his Professional encounters*— *In an Interview by D.D. Nambudiri*

Dr. D.D. Nambudiri (right) interviewing Dr. E.G. Silas (left)

Prof. (Dr) D.D. Nambudiri, formerly of College of Fisheries, Panangad, Kochi and presently Resident editor of Fishing Chimes in Kerala has had an opportunity of interviewing Dr. E.G. Silas, a phenomenon in the World of Fisheries.

Nambudiri says: Eric Godwin Silas, world renowned fisheries scientist lives in Ambady Retreat, in a quiet villa situated in the suburbs of Cochin City. At 82 he keeps himself busy. He is now the Chairman, Research Advisory Committee of Central Institute of Fisheries Education, Mumbai and Chairman of the Scientific Advisory Committee of Rajiv Gandhi Center for Aquaculture (MPEDA, Ministry of Commerce). He is a guiding force behind fisheries research in the country. His villa is by the side of Kaniampuzha River. He took me round and showed to me how he grows his own food fishes, Tilapia and Pearlsport in a secluded area in the river.

Dr Silas and his wife greeted me and my wife Prema, as we reached their residence, mainly for the purpose of having an interview with Dr. Silas for Fishing Chimes. Prema helped me in

noting down the points as my interview with Dr Silas progressed.

For Dr. Silas, the interview was one of travelling into the past. As a youngster, he evinced a deep love for nature and living organisms. He drifted from following his father's profession. His father was an estate manager. Instead of following his father's footsteps, he chose to become a fisheries scientist and administrator. He nurtures fond and respectful memories of his association in the 1950s with Dr. Carl L. Hubbs, doyen of Fishery Scientists in USA and with Dr. Sunder Lai Hora and Dr Salim Ali, who were mentors of his professional life. Silas is deeply conscious about the enormous quantum of effort and achievement needed in the fisheries sector, especially in the present deteriorating environmental conditions set in motion by global warming, over fishing etc. He expressed his concern over the present scenario of many of the predatory fishes high up in the food chain are conspicuous by their rarity. They are replaced by fishes of lesser value. He expressed disappointment at the perfunctory interest of the scientific

community at the alarming situation and their casual approach to the problem. Silas continues to entertain immense faith in the capabilities of the younger generation of fisheries scientists and hopes that they will rise to the occasion in solving the problems confronting the fisheries sector. Silas is confident that the fisheries research institutions would conform to the mandate given to them and would support scientific fisheries research in solving all challenging issues. Silas loves to be engaged in hard and purposeful work and by nature, and he takes heavy load of work upon himself. *Excerpts of the Interview :*

Q 1: You have worked as Vice-Chancellor, Kerala Agricultural University from August 1987 – August 1992. Did you find the job challenging? What was your significant contribution to the academic community?

During the first week of August 1987, I had a phone call from Mr. M. S. Joseph, IAS, the then Secretary of Agriculture, Government of Kerala that he would like to meet me on the next day in Chennai where I was Director of the newly founded Central Institute of Brackishwater Aquaculture, (ICAR). Mr. Joseph met me and informed me that they wanted a scientist to take over as Vice-Chancellor of the Kerala Agricultural University. His request was for an immediate answer as the Panel for Selection which included the Director General, ICAR was meeting at Delhi the same evening and my concurrence was sought. I had planned to settle down in Chennai, and had no idea of the intricate problems the University was confronted with.

Mr. Joseph was a gentle and persuasive conversationalist. He assured me that I would have a free hand in running the University. I agreed with the proposal and spoke to my wife about it at lunch. I was totally ignorant of what was happening in the University, except that Mr. Madhava Menon, Senior most IAS Officer in the State was the out-going VC. With the approval of the Chancellor



(Governor) the next day the announcement was made. Later, when I landed at Thiruvananthapuram, the Dean (Agriculture) met me, and the first thing he asked me was, Sir, what made you select this "bed of thorns". What he meant was that I stepped into a scenario where many of the Officers of the University were totally negative. Although the position was really challenging, on the next day, August 19, 1987, I took over as Vice-Chancellor, Kerala Agricultural University.

From the very first day, I could gauge the degree of indiscipline that was prevalent at all strata of the staff. The malady was a trickle-down phenomenon, starting with the faculty and going down the line. Seven colleges under major disciplines, 738 or so academic and technical staff; about 2,000 administrative staff; 25 farms with over 7,000 labourers, all preoccupied with several Units! A challenging scenario and I could understand the concern of the Deans who met me.

No doubt, man management was the most crucial issue, and I went in-depth to sanitise the most crucial sector, namely, that of the "Professors". The labour unions and student unions had their grievances and several issues had remained unattended to for the past several years which I found could be rectified through common sense decisions. The feed back on provocative actions, undermining the sacred status of a "teacher" were appalling. Having founded and managed a number of Institutions earlier, I felt confident that I could handle the maladies and find solutions to the problems. "Idle mind is Devils workshop". How true! Motivation, inculcating a work culture and accountability were my prime concerns to counter this malady and this worked wonders. Over 1,320 projects running for several years without results were pruned and brought down to less than 140 projects. Negligence of Guides had caused problems to dozens of staff and scientists in submitting thesis for their Doctoral Degrees. Rectification of this enabled over 50 scientists to get their Degrees within 18 months! Improving the academic skills and upgrading the System and scientific infrastructure was one of my major inputs. I must mention one important thing here. I had a gentleman Pro-Chancellor in the then Minister of Agriculture, Mr. V.V. Raghavan, who never interfered with my functioning and in the running of the University *per se*.

Q 2: As Vice-Chancellor, what were the methods you had adopted in KAU for the smooth and proper conduct of academic and related activities?

I had identified the nodal causative factors for all the problems and disharmony in the System. To many, there was a feeling that as a Fishery Scientist, I might not have an inkling of what they were up to in their research in Agriculture, Animal Sciences, etc and teaching. My lineage has been with farming and plantations and we always had live stock. The greatest blessing I had was my nearly 25 years of association with the Indian Council of Agricultural Research, with 28 national Institutions and over 75 All-India Projects- and it was learning from listening to experiences, covering a wide spectrum of subjects.

When I visited the colleges, Research Stations and farms in the University, I made it a point to meet all the teachers, staff and workers and discuss with them problems and solutions. This approach from a VC was novel to them. I do not know whether my predecessors had any interaction 1 to 1 with the professors about their research work and teaching load. I was able to establish an accountable relationship with this strata once I started looking at their work. A considerable amount of primary data had been accumulated in the farms. I motivated the staff to work on these, and I had the pleasure of conducting the first National Symposium on Coconut, and subsequently on Rice, Mushroom, Freshwater prawn *Macrobrachium rosenbergii*, and even an International Symposium on the Asian Elephant. It not only helped to update knowledge and skills of the staff, but also helped to motivate them for a work culture, weaning them to a large extent from politics and inaction. Student-guide relationships were strengthened so that many were benefited securing their Degrees, in doldrums in some cases for more than ten years.

Infrastructure development was equally important; so also newer avenues of research and improving the quality of education. External and international funding for research projects was encouraged. The Annual Budget of the University at the time of my taking over was about Rs. 11 Crores. Funds were not specified as Plan and Non-Plan, spending was arbitrary and even Provident Fund had been used for disbursing salaries and

labour wages. I introduced a system of budgeting, computerising even farm activities for monitoring, to improve governance and discipline. Attracting outside funding for projects was another motivation for work and improvement. I would consider these as the change and stimulus I could give to the University to enable its further growth. When I completed my tenure of five years in 1993, the Annual Budget of the University was built up to Rs. 47 Crores including Rs. 7 Crores for externally funded projects. These five years were never "a bed of thorns", but challenging and gave me great satisfaction.

Q 3: You were the Founder Director, Central Institute of Brackishwater Aquaculture, Indian Council of Agricultural research (ICAR), Nov. 1985- Aug.1987. What were the mandates of the Institute which could contribute to the development of fisheries Sector in the country? Are you satisfied with the way the Institute is functioning once you left the job in 1987?

The breeding programme of penaeid prawns was initiated by me at the Narakkal farm of CMFRI, in the early 1970s. ICAR felt that for the proper growth, a new Institute was to be established not only for improving technology of shrimp farming, but also of brackishwater finfish farming as well. The Central Institute of Brackishwater Aquaculture had the mandate of looking after the research, training and extension in brackishwater aquaculture as well as transfer of proven technologies. I was instrumental in getting the land and water areas for the Institute and its 90 acre farm at Muttukadu, about 35 km south of Chennai. I remember the days when I had initiated shrimp farming in the 1970s at Narakkal. Many including the then Commissioner of Fisheries, Government of India and those on the Board of MPEDA considered it to be unfeasible and wasteful expenditure, "swearing" that shrimp farming could never succeed. Their familiarity was with the Japanese kuruma shrimp which had a protracted farming period of 14 months or so. We demonstrated that our species could be bred after four to six months of farming.

At CIBA, Chennai, we were able to breed and culture *Penaeus japonicus* and other penaeids. Infrastructure for managing shrimp farming in the country, basic research on shrimps and finfishes

such as their physiology, biology, genetics, pathology and eco-friendly methods of farming were established. These developments helped in countering disease problems, such as the white spot disease in shrimps which were devastating the farming sector in a virulent way. Now the Institute has expanded its programmes to be supportive to the shrimp and fish farming industry and give training and consultancy where necessary.

Q.4: You have functioned as Director, Central Marine fisheries Research Institute, (ICAR) for 10 years (June 1975 – June 1985). CMFRI is a premier fisheries Institution in the country. What were the Institute's most significant contributions during this period?

A decade of work cannot be mentioned in a few words. CMFRI was established in 1947 to look after the marine capture fisheries of the country and to advise on its management strategies and issues. But, by the decline of major fisheries of the world by the early 1970s, aquaculture as a thrust area became important. So Mariculture Programmes were initiated by me at CMFRI. Still the main emphasis was on monitoring resource exploitation in capture fisheries at the national level and researching on biological and oceanographic factors influencing the fisheries. One thing I was very particular was that the research results should reach the stakeholders and the industry without delay. To meet this commitment, I started publications, such as the *Marine Fisheries Information Service*; *CMFRI News letters etc.*. Farmers training programmes were intensified, through the Krishi Vigyan Kendra; Operational Research Project and other extension programmes.

In the Mariculture programme, open sea mussel farming, edible oyster culture, Pearl oyster culture and pearl production, sea weed culture and so on were taken up. To be supportive to all these was the need for an education programme besides the regular training programmes in Mariculture. Working on this line, we were able to get an UNDP/FAO/ICAR Center for Advanced Studies in Mariculture for the M.Sc., and Ph.D. programmes with an outlay of over U.S.\$ One Million. The candidates coming successfully out of the course could meet the HRD requirements of the growing

shrimp farming industry, besides augmenting the scientific man power strength in Research Institutions and the Fisheries Colleges of the Agricultural universities, Agri. Banks and the industry.

Q.5: You were holding additional charge of ICAR Research Complex in Andaman - Nicobar Islands for one and a half years. What are the major problems faced by the fishermen in the outer islands and remote areas?

I was Special Officer designated by ICAR for developing the Central Agricultural Research Institute (CARI) at Port Blair, Andamans. CMFRI and the Central Plantation Crops Research Institute had a Research Unit each at Port Blair. These were integrated along with new Agricultural, Animal husbandry and Fisheries programmes suited for the Islands. Subsistence fishing by a few Andhra and Bengali fisher families was in vogue, while particularly those with immense potential for pelagic oceanic fisheries remained unutilised. Trawling grounds are limited. I have all along felt that the island waters were most suited for mariculture, especially for cage culture of finfishes, lobsters and ornamental fishes, and for restoration of some of the endangered invertebrates. As to the problems fishermen faced in the 1960s, fishermen from Kerala, Tamil Nadu and Andhra along with their boats were taken to Port Blair to conduct fishing in Andaman waters. However, most of them took to different avocations. An example is that Kerala fishermen opened tea shops. Mariculture can be developed in Andaman waters in a big way, and this will specially be needed to meet the growing demands of eco-tourism in the islands and the mainland.

Q.6: How do you compare your functioning as the Head of Central Government Institutes and as the Vice-Chancellor of the Kerala, Agricultural University?

From my early years, by habit, I have learnt to shoulder responsibilities, with some of them heavy. So it was not a problem to 'take in one's stride' new tasks. I look at life positively, without any bias or partiality. This gave me considerable strength. As an honorary research worker at the Zoological Survey of India during the first five years of the 1950s, I came to know what stinking zoo-politics are and had to face a lot of hardships. But these experiences were part of the learning

curve, and they gave me considerable resilience and capabilities to develop a detachment of mind, not to be affected from peripheral problems.

Those working in Central Institutes are well disciplined. I encouraged inter-organisational, inter disciplinary team work for major projects with supervision and monitoring. This approach helped me to decentralise and delegate responsibilities. On the contrary, at the Kerala Agricultural University, when I took over, things were chaotic and in a muddle with no accountability, least commitment to one's own work, be it teaching, research or management of the farms. Creativity and innovative thinking were lacking. But I must say that these were pockets of excellent work done by a few, but which got mired when you look at the totality of the picture. However, I did not have any serious difficulties or obstacles for rectification and restitution.

Q.7: You are considered a pioneer in tuna fisheries in the country. What are your contributions in this sector?

When I joined CMFRI as an honorary research worker in June 1959, the Director Dr. S. Jones had to obtain permission for my working in the Laboratories at Mandapam Camp from the then Fisheries Development Adviser, Dr. N.K. Panikkar. I was permitted to work, provided I did not impinge on the species the Institute was involved with. It was thus that I chose to work on tunas and tuna-like fishes of Scombroids only.

During my Fulbright cum Rockefeller Post-Doctoral Fellowship in USA, I had the privilege of working with Dr. Carl L. Hubbs at the Scripps Institution of Oceanography and had contacts with Dr. Milner B. Schaefer, Schimeda, Townshead and other scientists of the Inter-American Tropical Tuna Commission, San Diego. This experience helped me in my choice of the subject. Hardly anything was known then about tunas from the Indian Seas, and I was even questioned by one of our Fisheries Development Adviser whether these creatures occurred in the Indian Seas! We have come a long way from that. I have been able to contribute much to our knowledge of the biology and populations of coastal and Oceanic tunas from the Indian Ocean. In fact, way back in January 1962, I convened an International Symposium of Scombroid Fishes under the auspices of the Marine Biological Association of India, the



Proceedings of which were published in four volumes but these are now out of print. During the International Indian Ocean Expedition, I had worked for nearly 4 months on R.V. ANTON BRUUN carrying out tuna long-lining in the Indian Ocean, going as far south as 58 degrees S. I was also able to build up a good second line of tuna workers and had published over 40 scientific papers and monographs on Indian Ocean tunas and billfishes. Even today, it is one of our untapped resources. I am happy that the Government and the industry are evincing a greater interest on tunas, now.

Q. 8: You have worked as a Fulbright cum Rockefeller Post-Doctoral Research Fellow in Marine fisheries at the Scripps Institution of Oceanography, University of California, La Jolla, CA., USA (Worked with Dr. Carl L. Hubbs) (1955-1956). Did that experience mould your career in Fisheries Science?

Dr. Carl L. Hubbs, doyen of USA Fishery Scientists in the 1950s and thereafter, was my mentor, in the same as, Dr. Sunder Lal Hora was my mentor in India. My association with Carl and Laura Hubbs (they always worked together) opened up new vistas for me as I had been until then, only an Ichthyologist working on freshwater fishes from South Asia and also from China. This association gave me great confidence to take up biological oceanographic work and to plunge on to marine fisheries work. It enabled me to take up major projects/programmes and implement them and plan and manage ocean going research cruises in Research Vessels such as R.V. Varuna and FORV Sagar Sampada. It was an exciting period in my life. I had spent in totality a few years at sea on exploratory cruises and discoveries! Yes, it certainly helped in moulding my career. So also was my association with Dr. A. Salim Ali, a gem of a person who influenced me considerably in my work.

Q. 9: Tell us something about your family and education?

I have my wife, a daughter, two sons and six grand children. By God's grace, we were able to give good education to our children and they are standing on their own feet and doing well in their professions.

I started my school in Standard 3 at the Maharaja's High School, and from 5th

standard to School Final (10th) at the St. Joseph's English High School, both at Thiruvananthapuram. I did my Intermediate (present day plus two) at the American Mission College, Madurai and B.Sc., B.Sc. Honours and MA at the Christian College, Tambaram, Chennai. Thence, I did M.Sc by research at the Madras University, and obtained Ph.D. in 1954 and D.Sc. in 1972 from the same University. I was not an exceptionally brilliant student at school, but had some brilliant students as my friends. School Final was the toughest of examinations I had to get through.

Q.10: You were the Founder Chairman (1991-1995) of the Salim Ali Centre for Ornithology and Natural History (An Autonomous Institution of Excellence under the Ministry of Environment and Forests, Government of India, Coimbatore). This must have been of a different experience to you. What made you take this assignment?

I was an amateur naturalist and am still so. In the late 1940s and early 1950s, I carried out surveys in the watersheds along the Western Ghats from Kanyakumari upwards to the Tapti River and erstwhile Saurashtra. While hill stream and river fish were my focus, I never lost sight of enjoying nature in its beauty and majestic grandeur. During the surveys of the northern areas of the Western Ghats, Bombay Natural History Society (BNHS) was my base camp and I had come to know Dr. Salim Ali and the family well. On completion of my Ph.D. in 1954, he suggested that I join the BNHS and I was selected to the position of Curator of the BNHS and the Natural History Section of the Prince of Wales Museum, a great honour. After my US visit, I again rejoined BNHS as Registrar and worked there until 1959. Salim Ali as Editor of the Journal of the Museum, Humayun Abdulali as Hon. Secretary and myself as Registrar shared the same table for day to day working, with little banter now and then. Amazing!

My research bent of mind made me leave BNHS for Marine Fisheries while maintaining my links with the Society as a life member and in other capacities. When the Centre of Excellence namely, The Salim Ali Centre for Ornithology and Natural History (SACON) was established under the Ministry of Environment and Forests, Government of India, I had the privilege of being invited to be its founder Chairman for the first five years. It was

my personal commitment, respect and regard for Late Dr. Salim Ali that made me take up this task and at the same time function as Vice-Chancellor of the Kerala Agricultural University. It was also an awesome period when conservation and management of some of our endangered living resources and their habitats were critically studied in various parts of the country, including the distant Andaman – Nicobar Islands. The quality of work by the young scientists of SACON who spent day in and day out at the remotest and inhospitable terrain to observe and factually record the life habits of the animals such as the Gir lion, Asian Elephant and avifauna such as Great Indian Bustard, florican, megapoda, Jerdon's Courser to mention a few, enhanced our knowledge considerably and helped to develop management strategies. So also, application of GIS for wetlands and many other programmes. We had the great fortune to have late Dr. Laurie Baker help design the buildings of the Centre at Annakutty, Tamil Nadu, not far from Silent Valley, to blend with the natural surroundings. To my natural history bent of mind, this association was a very stimulating and an interesting experience.

Q. 11: Not much is heard about that Centre now a days. Are you satisfied with the functioning of the Centre now?

The Salim Ali Centre for Ornithology and Natural History is mandated to carry out work of excellence and I presume it is doing so.

Q. 12: You have worked abroad in several capacities, as Consultant to the Republic of Seychelles; Member, Evaluation Committee of the Marine Science and Fisheries Programme convened in co-operation with the UNESCO by the Sultanate of Oman; Consultant to the Saudi Fisheries Company (SFC), Dammam, Saudi Arabia; Member of the Committee constituted by the Consultative Group on International Agricultural Research (CGIAR) to review on the working of the International Centre for Living Aquatic Resource Management (ICLARM), Manila. How do you now look back at these activities?

All these assignments were important in that I was able to contribute constructively for the development of the programmes; critically review the

activities and options of organisations; suggest conceptual framework for reorganising and also to share knowledge. The Marine Science Institute of Oman did receive good funding for strengthening the programmes of the Institute. In the case of SFC, I had the good fortune to spend one month at sea on a Korean fishing vessel, at the age of 70, eating salted ribbon fish and sea weeds with a little rice. The fishing using most modern echo sounders and sonar, from Wadge Bank to Kori Bank near Pakistan and the Lakshadweep Islands gave good results about our deep water fishery resources. As regards the ICLARM review by Dr. Mc Lene and myself, it perhaps helped the shift from World Fish Centre Manila to Kuala Lumpur.

Q. 13: Government of India had entrusted to you the additional responsibility of organising and implementing the Research Cruise Programmes of the FORV SAGAR SAMPADA which you had executed successfully for the first 18 months. Thereafter you have been associated as Chairman of FORV SAGAR SAMPADA – SCIENTIFIC ADVISORY COMMITTEE as well as Member of the Programme Review Committee. What were your experiences and contributions in this sector?

I itch to go to sea. In the 1960s and 1970s I managed the research cruises of R.V. Varuna for several years and participated in over 45 cruises. I had also taken part in International Ocean exploration programmes during the International Indian Ocean Expedition and did four months of tuna long lining on board R.V. ANTON BRUUN. In 1984 when FORV SAGAR SAMPADA was constructed in Denmark and brought to India mainly through the diligent efforts of Dr. S.Z. Qasim who was then Secretary to the Department of Ocean Development, GOI, I took charge of the running of the research programmes of the FORV for the first 18 months. Scientists from nearly 35 institutions and Universities participated in the ocean going programmes. It was a challenging task and responsibility as the running of this large research vessel was to be under a tripartite Agreement between DOD, Shipping Corporation of India and the ICAR. I say challenging because I took over the task, though, even to this day the ICAR has not signed an MOU! But, mercifully no one has questioned me for what I was doing, namely managing the

research programmes of SAGAR SAMPADA. I am now functioning as the Chairman of the Scientific Advisory Committee and Programme Review Committee of SAGAR SAMPADA after a gap of a few years. Outstanding work on primary and secondary production of our seas culminating in the preparation of an Atlas; benthos of the shelf and continental slope; deep scattering layers and its dynamics; and Toxic Algal Blooms, to mention a few, are the projects which have considerably enhanced our knowledge of ocean science.

Q. 14: Do you think the fisheries sector can play a major role in ensuring food security of the people of our country?

Food security and fish security? What is happening in land based agriculture cannot be replicated in aquatic resources which are "unseen" resources in water. From one of exploitation, our approach should be eco-friendly and sustainable utilisation. We have two major areas, the capture fisheries and Aquaculture. In the former, the scenario is disquieting, as many of the large predatory fish high up in the marine food chain have gone out of the picture due to unregulated fishing and over-exploitation. What maintains the production levels is the replacement by low value fish. Our prime concern should be to restore depleted or declining fish stocks through proper regulatory measures and also studying their biology, and biocoenotic relationships. A massive effort has to go into this both from the Centre and the States with a participatory approach from the stake-holders and fishers. We have yet to understand the magnitude of the problems. New and dynamic approaches towards management of fish stocks for restitution are being taken up in Institutions such as CMFRI where intense study on vulnerability of nearly a hundred commercial species is under investigation. Sustainability of resource needs such backup studies.

Hats off to the fish farmers of Andhra Pradesh! They have shown how with their own intrinsic common sense carp culture could be scaled up to new heights; so also catfish culture. It is such enterprising and risk taking approaches that are needed to elevate aquaculture to greater heights. With an annual production of over 2.8 million tonnes, it has come very close to marine capture fisheries. A similar potential is there in Mariculture of finfish,

shrimp, lobsters, oysters, clams, mussels, sea weeds and so on. We have a long way to go and I am sure we could attain food security and "fish security" if we could accelerate the tempo of research, development, and transfer of technologies and at the same time utilise the resources in the Indian Ocean (Tunas, Billfishes, Squids) and not limit our vision.

Q. 15: How do you plan to move this sector forward in future?

In the capture fishery sector, priority should be for tuna and squid fishing from the Indian Ocean. At the same time the open entry system particularly for foreign fishing vessels even with Letters of Permissions should be stopped and regulations should be brought into effect for managing effort expended, the type of craft and gear used (including mesh-size of gears), and an approach towards directed fishery for specific resources and their management for sustainability. Concurrently, considerable amount of fundamental research is needed in areas such as ecosystem and biocoenotic relationships, loss of links in the trophic chain and the repercussions; taking into consideration the multi-species aspect; fast growth and longevity; reproductive potential; delineation of the stocks on genetic basis and strengthening the monitoring system of exploited resources.

The capture of young fish through destructive gears with uncontrolled mesh sizes; reducing the bycatch/ discards and finding ways for their utilisation through product development and similarly of non-conventional resources through value added products needs our attention. The domestic market for fish and fishery products is gaining in importance and needs fostering. Bar-coding and eco-labeling of marine organisms have become important and so also the Code of Practices and related aspects stipulated by the Marine Stewardship Council.

As regards aquaculture, there is further scope for development of the freshwater fish culture sector. Adoption of better management practices and safeguarding environmental quality for sustainable production become imperative. Genetic improvement of the stocks through development of pathogen free broodstock; and other desirable traits such as fast growth, meat quality, and disease resistance are essential for

sustainability of production. Sea farming has great potential. I should mention mussel culture as a top priority; so also culture of finfishes such as groupers, cobia and sea bass in cages in the sea and estuaries. The Aquaculture Foundation of India under the leadership of Dr. Sakthivel has done an excellent job in sea weed culture in Coastal Tamil Nadu, through Self Help Groups, especially of women. We need similar participatory approach for developing village community based mussel farming in the sea with land based infrastructure for depuration and product value addition. Such programmes will enhance employment opportunities as well as generate good income. I am mentioning this as an example for taking forward research results and passing them on to aqua-business.

Q.16: What are the challenges in front of us? Would you like to make changes in the existing system?

Research and Development in fisheries need revamping. For the last two and a half decades we have heard of technologies being developed and transferred, some like "instant coffee"! Without even replicate data!! Most of them are a one time affair as the farmer would not want to reinvest in it a second time. No doubt, we have done well in shrimp culture and hatchery seed production systems. Even here, in times of crisis, we do not have answers. The need for utilising saline soil areas for finfish and shrimp culture is coming up. To make this a successful inter-crop or rotation crop we face new sets of problems. These are challenging situations. Toning up our knowledge on the nutritional requirements of the candidate species, its tolerance to the environmental parameters it is subjected to; and enhancing our knowledge about its health requirements are very essential. I look forward to improved approaches to these problems and feel that organisations such as the Rajiv Gandhi Center for Aquaculture (MPEDA, Ministry of Commerce) where development and transfer of technology are the goals could help us go ahead to meet the demands of a five-fold increase in the production of quality aquaculture products within the next ten to fifteen years. This calls for a Mission oriented approach and sky is the limit.

The challenges in capture fisheries are many and varied and some are of international dimensions. We have not

been geared to this and only now feeble efforts are being made. We should have been looking at the ocean wide resources and not restricting our developments to 50 meters depth or 200 meters depth or the EEZ. It is restricted thinking. Fish do not have such limited ranges. Some are highly migratory and some, straddling stocks. We need a more dynamic and an aggressive approach to harness pelagic oceanic fisheries, just as the Japanese and later the Taiwanese and Koreans and now the Chinese are doing. All these are going on when we are waiting for economic viability reports and so on!! Fisheries need bold action and a good master plan. With the subject matter being handled by multifarious Ministries and Departments and the State administrations, without much exposure to marine life, who decides? We need a positive active action group which could plan out a road map for an ecosystem based fisheries development and not piece meal approaches. Restoration of depleted fish stocks to the 1990 level by 2015 was a decision of the UN Conference on Sustainable Resources held at Johannesburg in 2002. What have we done about this? We are still groping in the dark on many matters concerning marine capture fisheries.

Q. 17: Which is the most joyous moment in your life?

Joyous moments are many. I had the privilege of working with stalwarts such as Dr. Sunder Lal Hora, Dr. A. Salim Ali and Dr. Carl L. Hubbs. Looking back, I feel blessed for such association early in my life. One such joyous moment was the starting of the UNDP/FAO/ICAR Center of Advanced Studies in Mariculture at CMFRI in 1978-79 and the passing out of the first batch! Running of the Research Vessel *VARUNA* and developing and executing innovative programmes with a free hand, monsoon or no monsoon, gave me moments of great joy. So also starting mariculture researches on a wide spectrum of marine organisms. Nothing was more enjoyable than when, under tremendous stress, I was able to discover larvae of the Indian mackerel in the *VARUNA* collections, describe them and delineate the breeding grounds. Four months on board *R.V. ANTON BRUUN* during the International Indian Ocean Expedition and the collections I made from St. Paul & New Amsterdam Islands of the spiny lobster *Jasus lalandei frontalis* and a world review of the genus *Jasus*. I brought out gave me a great kick!

Similar was the feeling when I was handling large big eye tuna, albacore, bill fishes and lancet fishes from longline catches. Even the five year tenure as Vice-Chancellor of the Kerala Agricultural University gave me great joy and happiness as I was able to achieve many things. To me, a positive outlook only creates joy and happiness in what one is doing.

Q. 18: What are the changes you would like to make in the existing system?

Developing and sustaining a work culture. I would give great importance to this. One should love the work he is doing and be committed. Today, research programmes are undertaken based on team work and one should develop the capacity to integrate various facets of the work in the system and also show leadership. More than anything, be creative and innovative in thought and deed and do not hesitate to express your thoughts.

Q. 19: What is the future of marine fisheries the country?

The future is bright. I have come across young scientists who are exceptionally good, creative. They work diligently, but this approach should be all pervading. Sea going, scuba diving, underwater studies are all part of the work and a new breed of scientists have to be evolved for this, if we want to progress further with marine fisheries. Not only that, the tools for work, in this case, Research vessels and other infrastructure, need to be provided. For the schedule on research vessels, some clerk in administration fiddles with questions as to who should be entitled for quarter DA or half DA and so on. This trend should be changed and the approach should be to provide good incentives for working out at sea including insurance and other facilities. Greater co-ordination is necessary between the ministries and Departments dealing with fisheries matters. My suggestion is that we should have a separate Ministry for Fisheries and Fishery hydrography.

Q. 20: What made you choose this field – any reason(s)?

While in school, I helped my grandmother in looking after our agricultural activities including cultivation of crops such as tapioca, and tending to

coconut palms in the farm and other fruit trees and live-stock. My father worked for 30 years in the largest Tea Estate in Sri Lanka (Demodara) and when he returned to India in 1946, he became General Manager of M/S A.V. Thomas & Co Tea and Rubber Estates, 28 or so in number. My younger brother joined as covenanted officer in the erstwhile Kannan Devan Tea Estates (presently Tata Teas). So I could have easily walked into an Estate life, but I did not. To me hill streams and fishes had a fascination. From 1948 onwards, I had been sending hill stream fish samples from the Southern Western Ghats to Dr. S.L. Hora at ZSI, Calcutta and he invited me to go over to Calcutta and work on the material I had sent him. I spent the summer of 1949 in Calcutta with Dr. Hora. My first paper "On the Fishes of Travancore" was published in December 1949 in the Journal of Bombay Natural History Society while I was still a student of B.Sc. Honours at the Christian College, Tambaram, Chennai. The encouragement by my parents enabled me to carry on ichthyo-surveys of the streams of the Western Ghats and also work for some time as a honorary research worker at ZSI., Calcutta. I never regretted my decision to pursue research on fishes. Though I started my career as an ichthyologist and taxonomist, with the passage of time, I have been able to enlarge my vision to take in application of molecular genetics in fish taxonomy. I have an open mind and to me the learning curve never ends. My personal

experience is that good taxonomy has taught me to organise my thoughts and actions in a systematic, logical and sequential manner.

Q. 21: What significant changes have you seen during the past four decades in the fisheries sector?

The most significant event is that production from aquaculture has surpassed production from the capture fishery sector. While sky is the limit in aquaculture, in marine capture fisheries the potential of conventional resources is estimated at 3.9 million tonnes while we are harvesting about 3.163 million tonnes.

The technical feasibility of culturing some of our edible marine organisms such as mussels, edible oysters, lobsters, shrimps, and finfishes have been demonstrated. Shrimp farming has been a success, but for the imbalances on account of diseases and pollution and more recently the fall in price of tiger shrimp in the export market.

Advances have been made in studying the nutritional requirements of species under farming; culture of suitable live feeds; maintenance of hatchery and broodstock facilities; health care of the organisms and genetic improvements. Major strides have been made in mitigating disease problems and improving aqua-ecosystems to enhance growth and production.

In the inland sector, we have had the explosive development of carp culture and now catfish culture by the fish farmers of Andhra Pradesh. There has been an overall improvement in inland aquaculture production. There have been positive improvements in the newer and more durable designs of inland fishing craft and the type of gears used.

Post-harvest processing and product development have shown considerable improvements upholding international standards.

Q. 22: What is your message to the younger fisheries scientists in the country?

I firmly believe that every person has talents and in some it is hidden. It has to blossom out. You see more creativity and innovative thinking in today's youngsters than in yester years. Be diligent, honest, share and care and enjoy the work you are doing. UPHOLD THE HIGHEST INTEGRITY, ETHICS AND USE YOUR GOD GIVEN GIFT OF COMMON SENSE.

The interview came to a close with the conveying of the grateful thanks to Dr. E.G. Silas, the doyen of fisheries scientists in the country on behalf of *Fishing Chimes* for the wealth of his information-laden rich responses and after wishing him many more years of active, productive service to fisheries sector. 

