State Policies on Technological Modernisation and the Response of Fishing Community in Kerala

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Certificate

This is to certify that the dissertation entitled '**State Policies on Technological Modernisation and the Response of Fishing Community in Kerala**' submitted by **Anup Sam Ninan** in partial fulfilment of the requirements for the award of the degree of **Master of Philosophy** of this University is original work according to the best of our knowledge and may be placed before the examiners for evaluation.

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Certificates often defy social history. So the dissertation as a social document engage many actors, protruding in their absence, like the ubiquitous tea shops placed in the social history of modern Kerala. This dissertation is a product of endless debates and discussions 'over tea and cigarettes' in the dhabhas of JNU ; particularly to mention CSSP canteen and Dhruv's dhabha where the debts accrued on the dissertation are yet to be paid off!. More over, most of the names mentioned here are personal relationships spilled over to the dissertation, as they could take this dissertation as 'their own' at some point or other!.

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Chapter 1
Introduction

1.1 This is an age that 'navigate through technological forms of social life'[1] (Lash, 2001) where 'technologies pervade, impinge upon, and are related to' (Ihde, 1995,) most of the human activities. 'It is concrete in its manifestation, closest to our existence, and pervasive in its extent' (Borgmann, 1984). Hence, understanding the technological process is essential part of any inquiry into the dynamics of modern life.

The issues associated with technology are rather dynamic and complex, deeply embedded with the political, economic, and social questions. So, any attempt to understand technology as an autonomous discourse could hardly provide us with a comprehensive picture of technological processes in the society. Thus present essay is premised on an understanding that technology studies would be greatly enriched by taking into account how various political, social, and economic agents of a given society construct images of technologies, and experience the impact of the process of technological development. We contend such an analysis sensitive to wider social realities enables the researcher to observe the process of technological change as a function of social action by individual and collective actors. This

[1] Lash (2001) opines that 'in technological forms of life, we make sense of the world through technological systems'.

would render us sensitive to the questions of power and hegemony that inform any social context of technology. The modalities and the frame of reference for the exercise of power in the context of technology may be varied. For instance, Scott Lash argued that the power exercised in capitalism (real property) works with the right to exploit, where as technological capitalism (intellectual property) carries with it the right to exclude (Lash, 2001.) Lash's observation finds a stark illustration in the emerging 'digital divide' in our own country.

The specific problem that present study concerns itself is technological modernisation in fisheries during twentieth century in the Indian state of Kerala and its socio-political context. We deem it an appropriate instance for the study of the deep-seated technological processes for several reasons. Firstly, fishery as an occupational category has always been closely linked with the dynamics of technology with multiple local traditions and histories (Mc Pherson, 1993). The instrumental components of the technology could be altered according to the varying marine environment, which resulted in the multiplicity and complementarity of techniques (Kurien and Mathew, 1982) during the pre-modern days. However, the technological changes that came about with modernisation provided space for new rationalities to emerge. Hence, fisheries development as an area of study has a wider scope in technology studies. Secondly, as several previous studies pointed out, technological development

in fisheries consistently resulted in the marginalisation of the artisanal fish workers. Thus the problem we choose to study has the potential to draw our attention to issues pertaining to the relationship between technology, and structures of social control and control of resources. Thirdly, social consequences of technological modernization in Kerala precipitated in a popular movement that attempted to promote technological alternatives to State-directed dominant pattern of technological modernisation as a part of wresting back the control over the marine resources from the elite. In this light, we hold that an engagement with this problem allows us to grasp the logic of technological choices and their social contexts better.

Problem of the Study

1.2 Backdrop of Kerala Fisheries

1.2.1 Situated at the South West coast of India, Kerala is one of the major maritime states of the country. It has a coastline of 590 kilometers, which is around 10% of the India's coastal area. Due to the unique geographic and oceanographic features, Kerala coast is one considered to be among the most diverse and productive marine resources in the world (Fernandez, 1994). Kerala played a significant role in the fish economy of independent India as it contributed a third of the nation's total fish production till mid-seventies (SIFFS, 2001). In early 1980's, 40% of the country's seafood export earnings were derived from

the state (Babu Paul, 1982). It has a sizable population of traditional fisher folk; about one million inhabiting across the 222 costal villages across the state (GOK, 2002), as against the total three million marine fisher folk population of the country (Sathiadas, 1998). Of these, 170,000 are active fish workers. They constitute one fifth of India's traditional fish workers (Kurien and Paul, 2001).

1.2.2 There are three principal components in the fish economy: production, marketing (processing included) and consumption of fish (Kurien, 1978). The available literature suggests that there have been drastic transformations taking place in all three areas during the latter half of the twentieth century.

It is often argued that fisheries economy could be neatly slotted into traditional and modern sectors. However, the entry of Indian and foreign big business in 1970s mark the beginning of a third 'ultra modern' sector (Kurien, 1978a). In all the three components of fish economy listed above, these three sectors have had peculiar operational principles.[2]

The production and marketing were confined to the artisanal fisher folk till 1960s (Fernandez, 1994, Jona, 1993). On the basis of their collective, generations-long knowledge systems, they have made their technological devices (Fernandez, 1994)

[2] See appendix for an inventory that distinguishes the various sectors.

according to the nature of the oceanographic specificities, seasonal variations, and species particulars (Kurien and Mathew, 1982, Kurien, 1985). It is argued that almost the entire marine fish production was from country crafts propelled by wind and manpower till 1960s (SIFFS, 2001). The artisanal fish workers who have been traditionally engaged in the fishing activity were always in the lowest rungs of social, economic and political stratifications (Kurien, 1985, Jona, 1993)[3]. As far as the consumption of the produce of the traditional sector is concerned, it is assessed that it has been predominantly meant for local population. It was 'fish produced by the masses for (the consumption of) the masses' (Kurien, 1985).

1.3 It is often held that the planned development of fisheries in Kerala, with its emphasis in modernisation and capital-intensive technology, commenced from the Second Five Year Plan onwards. How ever, one may trace the origins of modernization to the Indo-Norwegian Project (INP) that predates second five-year plan and conceived outside the purview of the state planning (Kurien, 1978b, Achari, 1994).

[3] According to the Techno Socio Economic Survey (1990) of Kerala, the state has the fishers population of 836880 which is 3% of state's total population. There is a prepondence of males over the females (946 female/1000males) which is a reversal of Kerala's sex ratio. The literacy rate is also much below the state's average (63% males, 59% females, aggregate average -61%). Only 41% of the marine household get protected drinking water where as 80% does not have toilet facilities. Their social status is low with a traditionally 'unclean' profession (Udayabhanu, 1994) and are often considered as untouchables (Halfdanardottir, 1993). The fishers were mostly out of the political activities before the late 1970s. Participation of the communist rebellion of Punnapra-Vayalar in 1946 (Udayabhanu, 1994) and their church induced participation in the 'liberation struggle' against the first Communist Government in 1959 (Kurien, 1988) are cited to be their political role in the modern Kerala politics.

The Indo-Norwegian techno-economic aid Project has emerged out of a tripartite agreement between the Government of India and the Government of Norway with United Nations as the mediator[4]. It was started in 1953 in two fishing villages of South Kerala (Klaussen, 1968). The INP had a tremendous impact over the fisheries in Kerala as it initiated the modernisation process in an unprecedented fashion. The social changes unleashed by these technological changes were summarised as one of challenging 'the exclusive control over the living resources' by one group by 'more powerful economic and political forces' (Gadgil and Guha, 1995).

The **First phase** of modernisation is spread over a span of fifteen years. INP took prime initiative in this period. It started with an effort to a gradual mechanization of the existing canoes (Klaussen, 1968). Kurien and Achari (1988) observe that this phase considered the 'fishing sector primarily as a source of livelihood and food for the local population'. The attempt was to increase the productivity. This involved upgrading the existing technologies and gradually introduced new technologies in both production and processing. By the second half of 1950s state department too started taking initiatives for mechanisation as the part of the Second Five Year Plan (Achari, 1994). Conceding to the demand, the government assisted the fish workers to introduce the gill net boats, in early 60s. They played a

[4] INP was implemented as a part of the Community Development Programme that initiated in 1952.

complementary role in the artisanal fleets (SIFFS, 2001). However, with the success of trans-national marketing experiments (especially with USA) in the marketing of prawns, a new phase was heralded in Kerala fisheries. This boom is often characterised as 'pink gold rush' (Jona, 1993). During this time trawlerisation became synonymous with mechanisation (Fernandez, 1994).

The **second phase** of modernization started with the INP formally handing over the project villages to the Government of Kerala in 1963. It was a period of rapid modernization. It is marked by a phenomenal increase in the influence of exogenous factors on fisheries policy and economy. (Kurien and Achari, 1988) In this phase Norwegian assistance was primarily used to set up Integrated Fisheries Complexes. It envisaged large-scale commercial fishing operations in the light of international market conditions prevailing at that point (Kurien, 1985)[5]. The small-mechanised boats with bottom trawl nets experimented with in the first phase found to be very effective in prawn harvesting during this phase.

However as Kurien opined, the Norwegians had little role in determining the overall dynamics and the direction of fish economy in the post-1963 phase. The unprecedented government emphasis on fisheries, as an outcome of prawn-induced foreign exchange generation, has resulted in the further entry of non-

[5] The exogenous factors are to be discussed later.

fishing entrepreneurs in large numbers with huge chunks of merchant capital (Ibrahim, 1993). An explicit policy change had occurred in the mid-60s to this effect. In the new policy, mechanisation was promoted by providing financial incentives for the introduction of trawling boats and latest processing techniques even as the state subsidies for the artisanal fisheries were being withdrawn (Kurien and Achari, 1988, Jona, 1993). It is noted that sixties marked a gradual process of polarisation of the fish economy in to 'traditional' and 'modern' sectors (Kurien, 1985). On the consumption side the shift was definitely towards the production and processing of export oriented methods and species (Kurien, 1978, 1985; Kurien and Achari, 1988). There was a great rise in the productions and exports between 1970 and 1975 (Kurien, 1985, Kurien and Achari, 1988). The average production of 3,80,000 tonnes stood closer to the Mean Sustainable Yields[6] of the inshore Kerala (Kurien and Achari, 1988). The prices of fish, productivity of the labour, and the export earnings reached higher standards. The entry of merchant capitalists, particularly in the ownership of mechanised boats and processing facilities, was the most notable feature of this phase (ibid).

The third phase said to be one of **stagnation and declining production.** It corresponds the years 1976-1985.

[6] Maximum Sustainable Yield (MSY) is the biological and economic yardstick for the sustainability of fishing stocks. It is an average wherein the marginal yield of a fishing effort estimated on the basis of biological and ecological factors. It is by employing MSY that the economic and biological over-fishing is assessed.

Significantly, inspite of the decline in the productivity during this period, the profits continued to raise as the international prices have been on constant rise whereby the total value of the produce remained higher than the value of the produce of the previous years (Kurien, 1985). Further, the 'modern' sector continued to get the economic incentives, and the mechanisation and processing facilities continued to grow in this phase too. Moreover industrial capitalists began to operate in marine fisheries, with high degree of technological sophistication (Kurien, 1978b). Their involvement marks the high investment ultra modern techniques of production and marketing, along with the ultra modern consumption preferences (ibid.).

1.4 There was an apparent economic recovery in the late 1980s and particularly between 1990 and 1995 (GOK, 1996). However, the 1980s were known for political and technological interventions by a major section in the marine fisheries, viz., the artisanal fish workers (Vijayan, 1985). They became particularly active in the Christian dominated southern part of the state during the early 1980s.[7] Through the social activism with the support of church-related social action organisations the activist-researchers could keep track of the complexities involved in the sector. By the late 70s they could come out with extensive

[7] The marine fishers of the northern and the central Kerala are predominantly Muslims and Hindus where as the southern parts of the state is noted for the concentration of the Latin Catholic population. Of the total fisher population, Christians-particularly Latin Catholics- constitutes 37% whereas Muslims and Hindus constitute 30% and 27% respectively.

analyses of the fisheries development policies and its impact particularly on the artisanal fish workers (Kurien and Achari, 1988). This has laid the academic and theoretical foundations of political and technological interventions that emerged as a mass movement in the 80s.

1.5 There was a progressive decline in the economic status and options to livelihood of the artisanal fish workers (Hakkim, 1980; Achari, 1982). Their productivity as well as the income declined sharply from 1960s onwards (Kurien and Vijayan, 1995). The pattern of access to marine resources also has been reversed with the assent of international trade (Kurien, 1985, 1987). Far reaching repercussions ranging from wide spread migration of both men and women from artisanal communities (Meynen, 1989, Warrier, 2001) to ecological imbalances (Kurien, 1978, 1987; Jona, 1993) occurred in the sector. With the overall fall in fish production and the resource depletion in mid-seventies, the artisanal fish workers perceived inaccessibility to their customary resource base as a consequence of mechanisation. They have addressed the crises in two principle ways depending on the technological options available to them. A section who could afford to transform themselves made use of the changing economic opportunities and emerged as entrepreneurs. But the majority of them, who had undergone a progressive marginalisation following the drastic techno economic change,

ventured in to unionised activism (Kurien and Achari, 1990). Those who have opted for entrepreneurship naturally found the prevailing technology ample for the optimal economic benefits in its operative design. On the other hand, the unionised mobilisation spearheaded by *Kerala Swathantra Matsya Tozhilali Federation* (KSMTF)[8] held the position that the introduction of new technologies resulted in the destructive consequences for the livelihood of artisanal fish workers (Meynen, 1989; Aerthayil, 2000). Thus the divergences in the understanding of modernisation stood at the root of the underlying premise of political mobilisation among the artisanal fish workers in its inception.

1.6 At the same time, there were attempts to search for other technological and economic alternatives to overcome the resource depletion and economic crisis. One such prominent experiment is the formation of South Indian Federation of Fishermen Societies (SIFFS) in 1980. Though initially, SIFFS attempted to provide better marketing facilities for the artisanal fish workers, particularly in the southern Kerala and the bordering areas of Tamil Nadu. It later on ventured into technological innovations. It assisted the artisanal fish workers to motorise their traditional crafts[9]. It managed to get immediate

[8] Kerala Independent Fish Workers Federation.

[9] The motorisation initiated by the SIFFS resulted in the intensification of the internal contradiction among the artisanal fish workers as it has also added the depletion of the resource base- the premise

acceptance from the artisanal fish workers. However technologies propagated and promoted by SIFFS eventually developed snags and led to frequent failures (Meynen, 1989). Taking lessons from the earlier experiment, SIFFS then attempted to develop plywood boats. Many individual fish workers, technical agencies, and fish workers' organisations associated themselves with the venture (Kurien, 1991b). It also involved a range of technological interventions associated with fisheries, in the aid of the artisanal fish workers (Annual Reports, 1993-1999). The technological development involved fish workers and field experts, where the design is modified according to the varying local conditions of its use.

The collective efforts by the fish workers' organisations further intensified the motorisation process under collective ownership and community sharing of production. However, the problem of resource depletion persisted with the intensified fishing activities. As part of the collective response to this problem artisanal fish workers started creating ecological rejuvenating systems like artificial reefs i.e. fish sanctuaries where the marine ecosystem can sustain without any external disturbances. Begun in a village, the 'people's artificial reefs' spread far and wide across Kerala costal bottom, with the active initiatives from the artisanal fish workers (Kurien, 1991b).

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behind the opposition to 'modern technology' (Meynen, 1989). But KSMTF argued that it is the only option left for the artisanal fish workers to stand against mechanised trawling (Kurien, 1991a).

The technological interventions from 'the below' have not only transformed the dynamics of the fishing community, but it was incorporated into the State's dominant paradigm of technology as well. The State agencies began to study and adapt many of the technological options emanated beyond its realm (Kandoran, 1989; Narayanan, 1989).

1.7 This exploratory study attempts to understand the problem of technological choices in the context of the fisheries sector in Kerala; with particular reference to technological initiatives evolved along with planned development. It aims to look in to the deep-seated socio-economic and political processes in the technological adaptation/design that make it socially contingent.

At present there are two somewhat opposed views about the relationship between technological change, political mobilization, and community. One is that, while analysing the political mobilisation and the public initiatives, the role of technology is crucial as far as the artisanal fisheries is concerned. Kurien (1991b) proposes 'co-evolutionary development potential'[10] that 'approach both the earlier and the more recent systems of knowledge and the resultant technologies with more holistic attitude and understanding'. He argues that truly interactive and participatory processes of development of

[10] Originally developed by Norgaard, towards a holistic understanding of technological change and adoption. (Kurien, 1991b).

technologies can become the important elements in the pursuit of knowledge.

On the other hand, Wicky Meynen observes in a more skeptical vain that this alternative development initiatives from the bellow as involving complex policy contradictions and dilemmas (Meynen, 1989). It is argued that such alternative development proposals are problematic in its political and social acceptability. The social differentiation precludes the very notion of community especially when the internal differences are increasing with modernisation and its incorporation. More over Meynen (1989) argues that, the alternative put forth on the basis of the specific traditional features of the artisanal mode of fishing and the values of the communities will fall short of their viability in a competitive framework that has drastically different operational principles. It is further argued that due to the same competitive framework, these alternatives cannot realise their collective ecological interests too.

1.8 While **defining the universe** this study attempts to understand the various agencies like the State, market, and the fish workers involved in the process of technological development with a particular reference to the State and the section of workers who have been part of this process. Confining the focus of the study to the roles of two agencies does not mean to negate the intertwined co-existence of the other agencies like

the mercantile class or the local and trans-national consumers, but rather it is due to the limitations of time and resources associated with such a project. More over, the study would only focus on an organised attempt of technological intervention while discussing the response emerged outside the realm of dominant technological practice, due to the same limitations. Thus, it fails to cover perhaps the most vibrant and organic innovations that take place in the scattered, unorganised, and geographically different (other than in the southern Kerala) areas of technological exercise.

The term State Policy is used as a generic term that constitutes the programmes, plans, and legal enactments of both the State and the Union Governments of India besides the stated policy formulations. It is an effort to approach the dominant technological paradigm that the State upholds. Though the possibility to overlook the internal dynamics of the State Policies is ingrained in this approach, the study attempts to overcome it by constant diligence.

The study employ the term Technological Modernisation to indicate a capital intensive upscaling of technology in production and /or in processing of fish that result in enhancing the production/productivity/product variety so that its market potential is broadened (particularly resulting in the products reaching beyond the local consumption hitherto). At the same time, it does not juxtapose the so called 'traditional technology' as

the binary opposite of the modern technology precisely because it argues that the emergence of modern technology, be it is exogenous or of domestic innovation, is a logical continuum in technological development according to the changing economic and socio-political conditions.

The Response of the Fishing Community in the title denotes its relation with the State Policies. That is to say the manner in which the State Policies have addressed the response of the multiple actors who have involved in the process of technological modernisation. In short our aim here is to understand the process and roles of different actors in setting the discourse on technology in a given society.

1.9 The **research design** has been conceptualised with following problems:

1. How the technological modernisation took place as part of fisheries development in Kerala?
2. What is the role of the State in setting the paradigm of technological modernisation? Whether its preferences over the technology remain uniform across the times or does it vary?
3. How the State constructs its technological understanding in the process of modernisation?
4. Are the endogenous and exogenous technologies mutually conflicting? How do these technologies, presumably evolved in different socio-economic and political circumstances, are adopted

or rejected? Whether the long-term socio economic impacts have anything intrinsic to those technologies?

5. Why and how the other agencies, particularly that represent the marginalised interests, intervene in the dominant technological paradigm? How far it alters the State's perceptions on technology, and is there a scope for the democratisation of technology?

1.10 The **methods** that are employed in the study are review of documents and interviews. Though the study largely relies on the data generated by other studies that took place in the areas, a variety of tools were used in addition to it. It includes informal interviews, discussions with the experts and the practitioners, review of bibliographical accounts etc.

In order to understand the conception of technology in the fisheries development as conceived by the State, most of the plan documents, documents on special programmes, committee reports, and other discussion papers brought out by the state Department of Fisheries, the State Planning Board and the Directorate of fisheries are reviewed.

A great deal of literature has been emerged on the process of fisheries development in the last three decades from the academic and activist circles. Both academic/research institutions and activist documentation centers aided in this pursuit. This study largely makes use of these literatures in qualitative and

quantitative terms for its analysis on the process of technological modernisation.

This study engaged interviews at different levels as a methodological approach. It included fishery experts – biological and social scientists, activists-researchers, field activists and other political activists, and fish workers of different levels from bonded labourers to entrepreneur fishers.

It also made use of monographs and biological sketches on the fishers along with the documents depicting the social history of the artisanal fishers.

Though this study made use of the libraries and documentation centers in Delhi, Kochi, Kottayam and Thiruvananthapuram, the study is largely confined to the Southern Kerala, particularly Thiruvananthapuram due to its emphasis on the South Indian Federation of Fishermen Societies (SIFFS) while discussing the organised technological interventions on the States' understanding of technology.

1.11 The overview of the chapterisation.

After the introductory chapter, the second chapter attempts to define the problem on the basis of the existing studies. The broad review of literature attempts to cover the theoretical orientations of the study and the studies so far taken place in the field of fishery development of Kerala that prompt the relevance of the present study. The third chapter makes an effort to understand

the development of fisheries in Kerala, with an emphasis on the historical background and the State policies. The later part of the chapter looks into the developments that emerged as the part of the modernisation process, and the efforts initiated by the South Indian Federation of Fishermen Societies (SIFFS) as the technological and political response to this process. The fourth chapter proposes to observe the process of technological modernisation in the larger historical context of Kerala's modernisation process, and it tries to repudiate the existing analysis of fisheries development as an isolated sectoral development exercise and thereby its gross emphasis on the 'impact studies'. The concluding chapter lays its emphasis on the larger understanding of the fisheries development process in the context of technology studies.

Chapter 2
Defining the Problem

'The different instruments used by man (tools, arms, clothing, all kinds of utensils, etc.) are all products of collective activity. They are all symptomatic of a given state of civilisation; that is to say, there are well-defined relations between them and the type of societies using them. The determination of these relations thus constitutes a sociological problem and, viewed in this perspective, technology is a branch of sociology.'

-Emile Durkheim(1900).

2.1 Understanding Modern Technology: A review of the Studies

Technological development is one of the basic foundations of modernity to the extent that modern technology is referred to have created a Second Nature (Rapp, 1999). Though the Industrial Revolution marks a clear transformation in the instrumental components perceived to be technology as compared to the other temporal zones (i.e., Europe before Industrial Revolution and, the non-Western parts of the globe that was not exposed to the Industrial Revolution that time), it always intrinsically involved material and cultural aspects. If the elementary function of technology is to fulfil the basic needs, the

collective nature of human existence makes the fulfilment of these needs a cultural exercise[1]. Hence, it is argued that, technology is, by definition, a part of culture. It cannot 'content itself with a vision of reality that creates an arbitrary separation between material, social, religious and economic categories' (Mahias, 1993).

The Baconian understanding of the mastery over nature, with the immediate valorisation of techniques[2], was substantiated by the Newtonian mechanics and it worked in tandem with the socio economic process that resulted in the technological development associated with the Industrial Revolution. Thus the scientific and technological revolutions of 16th and 17th centuries also culminated in the setting of Industrial Revolution in 18th century.

Along with the positivistic understanding of systematic knowledge developed the linear model that observes technology as the systematic application of scientific knowledge. The evolution of the theoretical orientations towards technological determinism is rooted in the positivistic linear model that attributes an inherent logic in the application of scientific ideas that manifests in technological artefacts. Thus, the post-Enlightenment traditions of social analysis foreclosed the scope of inquiry from problematising the process of technological

[1] Borgmann (1984) argues that devices represent the clear and accessible cases of the paradigm of modern technology. In this light, it is interesting to look at Rapp's (1999) argument that technological artefacts are designed to extend the natural capacities of humans: the car multiply the efficiency and range of locomotion; television extends the sight and telephone, the hearing.

[2] Bacon attributed significant changes, more to the invention of gunpowder, printing, and the compass than to the contributions of traditional philosophy.

change, by confining it to the monitoring of social adjustments that followed the technical progress (William and Edge, 1996).[3] However, the drastic material and technological transformations, with particular reference to the disasters that occurred in the course of technological progress by the 20th century, resulted in a closer inquiry into the very nature of technological process themselves (Tyabji, 1997). There emerged the wide-ranging analytical possibilities in place of the reductionist technological determinism.[4] It is argued to the extent that, though the 'universal rationalism' that is rooted in the 'technological understanding of modernity' still prevails over the technical and policy apparatus of national and trans-national administrative bodies, there is a strong intellectual discontent in the very notion of universal rationality (Feenberg, 1996).

2.1.1 On the basis of the philosophical inclinations, Borgmann (1984) distinguishes **three** essential types of **approaches** in understanding technology. First is the **substantive view** of technology, which deems technology as one of the dominant forces that determine modern day societies and its values. This view is often referred as Sociological Approach or Technological

[3] Due to this, 'impact studies' prevailed in the social research, and in technological studies for a while.

[4] It is no way arguing that reductionism (that understands technology as reflecting a single rationality) is either confined to the domain of technological determinism or it (was) a time bound phenomenon. Rather one finds its various manifestations in the form the neo-classical tradition of economic analysis (Coombs et al., 1987) or philosophical inclinations of reductionist technology, see. Pitt, 2000.

Value Determinism, and has traces of the 'anti technologist' position also. Borgmann cites the theoretical position held by Jacques Ellul as substantive view of technology.

Second is the **instrumental view** of technology, also called as Anthropological perspective. It understands technology as extending the human capabilities to the making and using of artefacts. As technology is the instrumental expression of certain guiding values, this perspective problematises the guiding values for the rational inquiry. Hence, Borgmann considers 'rational value determinism' under the instrumental approach. The instrumentalist perspective that upholds technology as a value-neutral tool has triggered one of the major debates in technology studies.

The **pluralist perspective** evolved out of accommodating various trends and complexities of many interacting forces. Being the meeting ground for many approaches, pluralist approach takes 'the entire complex web of numerous countervailing forces' into consideration. Borgmann opines that the pluralist view is ambiguous in reflecting the radical transformation that modern technology puts forth, as he finds the perspective often failing to observe the 'strong and pervasive social adjustments' that made this transformation possible.

2.1.2 While attempting to analyse the relationship between technology and society, another categorisation that comes to light

is the opposing perspectives of **technological determinism** and **social shaping of technology** (Hoare, 1997). From the time of its 19th century proponents like Saint-Simon to the 20th century advocates like Thorstein Veblen and Vannevar Bush, technological determinism found ample space in the emerging economic and political structures, despite the criticisms raised against it (Freeman, 1974)[5]. Technology is attributed to be the primal cause for societal organisation and change, as per technological deterministic point of view.

On the contrary, the analytical frameworks broadly called as 'social shaping of technology approach' look into the 'socio economic patterns embedded in both the content of technologies and the process of innovation' (William and Edge, 1996). According to this perspective, it is argued that there are choices[6] 'inherent in both the design of individual artefacts and systems, and in the direction or trajectory of innovation programmes'. Thus the social shaping of technology approach analyses the direction as well as rate of innovation, the form of technology (the content of technological artefacts and practices) and the

[5] Technological determinism faced criticisms from both academic disciplines as well as other domains at various levels. Malthus, Richardo, Charles Dickens, Orgeta Y Gasset and the like were concerned with the repercussions associated with technology and its development.

[6] (a) A choice does not necessarily imply a conscious decision. Rather it denotes the existence of two or more possibilities with varying similarities in attempting a technical problem (or a set of problems). Each choice, possibly, may have different or peculiar material and social consequences. It is argued that societies choose the technological features from a whole range of possible technological options, that their environment, their traditions, and contacts with external agents (to their society), lay open to their means of action on the material world (Lemonnier, 1993).
(b) Lemonnier (1993) opines that anthropology is significant in understanding the process of choice and their implications. As a discipline that employs a systematic study on the diversities, Lemonnier argues, anthropology can identify technical choices effectively.

outcome of technological change for different social groups (on the basis of class, gender, race, physical attributes).

2.1.3 While discussing the philosophical questions of technological studies, Brey (1997) prefers to call this broad category as **social constructivist approaches**. Brey, who considers the social constructivist approaches among the most influential models of technological change at present, identifies three varieties of constructivism. The most characteristic variety of social constructivism is called as **strong social constructivism,** which is associated with the sociology of scientific knowledge, Social Construction Of Technology (SCOT) approach, and the works of H. M. Collins and Steve Woolgar. As per this approach, technological change is explained by reference to social practices of different actors and social groups.

The approach, which Brey categorises as **mild social constructivism,** holds the position that technology is socially shaped. At the same time, it does not reject the role of non-social factors in technological change though it is often argued that these non-social factors are also operated in a social context. The moderate models, which MacKenzie and Wajcman denote as the 'social shaping approaches', are referred to be mild social constructivist.

The third variety that Brey identify is the **actor-network theory**. According to this view, the stabilisation process of

technical and scientific objects is the result of actor networks comprised of human actors, and technical and natural phenomena. Works of Callon and Latour are among the significant contributions to this approach.

2.2 Evolution of Technological Studies

The encounter of modern technology with tradition has been an area of inquiry from the very beginning of the technology analysis. The studies have addressed the issue of tradition from different platforms[7]. Modernity in its technical essence is understood as the spread of a unique technological system that stands against the traditional cultures in homogenising the globe (Feenberg, 1996). And it is also true that, as Feenberg argues, the global phenomenon of modernity (modern technology) struck down the traditional cultures of Europe before spreading its universalistic rationalism to the rest of the world[8]. Since the means in the traditional culture is inextricably woven into the context of ends (Borgmann, 1984), the estrangement of the user with device is epistemologically alien to traditional cultures. As the technical representations are part of a wider symbolic system

[7] Though it has been confined to 'impact studies' (e.g. Foster, 1962) initially, not only due to the linear technological determinist perspective but also due to the 'white man's burden' to civilise the rest of the world, it broadened its area along with the theoretical and philosophical developments in other social sciences. The recent inquiries into technology question the very epistemological logic of modern technological rationality (Nandy, 1991)

[8] E.P. Thompson (Thompson, 1993) analyse the social history of technological change in the close-knit English village communities during the 16th century. He analyses how the subsistence farming spread whole through the society as a web, has been transformed with the building of better roads and wagons. With better transportation facilities the farmers began to sell their produce at distant markets for better prices. It eventually resulted in the thorough altering of the social organisation.

(Lemonnier, 1993), it is significant to look in to the epistemological differences that are manifested in the process of technological choices, while studying the relationship between technology and society.

2.3 This study broadly keeps its methodology on the social constructivism. It is to argue that the technology is a socially contingent process wherein the formulation, adoption and rejection involve deep-seated social preferences. This study draws its theoretical inspiration from the various strands of social constructivism, but particularly engages the concepts of 'technological frame' and 'script' of the artefacts while attempting to elaborate the process of technological development and interventions in Kerala fishery. Bijker (1992, 1995) uses the concept of 'technological frame' as the 'repository of knowledge, cultural values, goals, practices, and exemplary artefacts shared by a social group, which structures their attributions of meanings to objects and processes of technological innovation, and their subsequent actions.' (Brey, 1997). The 'script' of the artefacts derived as the part notion of actor-network approach by Madeleine Akrich (1992) and Bruno Latour (1992) states that the technological designs inscribe a vision of the world into their designs and as a consequence of that the designs embody a script that has the inherent qualities of the users, their social relations, the environment it emanates, and so forth.

2.4 Fisheries: Global Context

2.4.1 In Europe, fisheries as an economic activity had found its international market and large-scale finance even prior to the emergence of capitalism (Thompson, 1985)[9]. It evolved with the changing economic situation and social organisation. And hence, despite the general resemblances in the production activities, it is difficult to club the localities that have got integrated into the world fisheries market later, into a uniform paradigm. So it is methodologically insufficient to inquire the fisheries development by employing the binary postulates of 'traditional' in relation with 'modern' in general.

2.4.2 However, the developing countries in general, have followed the artisanal pattern of fishing activity. It had used the labour intensive simple techniques for catching, processing and marketing of fish, which catered mostly to the local markets in low prices (Platteau, 1989). But there was a rapid expansion (both in catches and volume) of world fisheries that took place after the Second World War. It gets particularly significant because of the ever-increasing contributions by the developing countries, where more than one-third of the total catch is absorbed into the international trade in the recent decades (Platteau, 1989).

[9] It is argued that large-scale merchant-financed enterprises and international market operations have started in the European fisheries as early as the early middle ages (Thompson, 1985).

While discussing the experiences of the various developing countries, Platteau (1989) observes the major forces behind this rapid transition. Coupled with the new initiatives of modernisation, the ideology of planned development designed the national policies from-the-above, where the traditional sectors of economy were given least priority. At the same time, large fish resources were discovered in the waters off the coasts of many developing countries that activated the modernisation process by availing efficient technological assistance from the West. It was further intensified by the emergence of the higher international demand for frozen fish (especially for the tropical species). Given the pretext, most of the developing countries promulgated export friendly policies as they found it as an easier economic option to deal with the balance of payment constraints. In many cases, national and trans-national interests (financial, technological, and commercial) have driven the developing countries to venture into ambitious fisheries development programmes that resulted in the modernisation of fisheries production, processing, and marketing.

2.4.3 Studies on Fisheries Development in Kerala: A Review

The course of development of fisheries in Kerala with emphasis on modernisation is widely described as a post-independence phenomenon. (Platteau, 1989; Kurien, 1978, 1988, 1991; Kurien and Achari, 1988, 1994; Achari, 1983, 1987; Vijayan, 1985; Aerthayil, 2000). The studies widely discuss the

post-independence upswing of fisheries economy as the major yardstick of modenisation in the sector. Often, the Indo-Norwegian Project (INP) is directly said to have enunciated the modernisation process (Kurien, 1985; Vijayan, 1985; Aerhayil, 2000). John Kurien (1991) states that, till independence, the traditional marine communities had engaged in fisheries, with an in-depth understanding of the aquatic eco-system, operating with appropriate technologies, and considering fish as a source of livelihood. Fisheries gained importance with the onset of post-independence economic planning in India. 'Modernisation-growth oriented model' of development was set with planning process. It started with the 'slow-modernisation phase' of 1956-1966, which considered the fisheries as a means of livelihood and food for the local population (Kurien and Achari, 1988). It was followed with the 'rapid modernization phase' between 1967 and 1980 when the export promotion was the thrust of fisheries development. The 'dilemma phase' followed the rapid modenisation phase, when the ecological and economic impacts of the development become prominent (ibid.).

By the end of 1970s, marine sector in the state headed towards ecological crises of overfishing. It was also coupled with the two-pronged response of the artisanal fish workers, who had accrued only peripheral benefits in the process. The immediate response was to form organised protest demanding the state intervention in the technological practices that they perceived as

destructive. The slower response was to adopt new technologies to enhance their receding share in the catch.

Taking the efforts evolved from the below into account, Kurien (1991) advocates participatory, collective and individual responses 'that can be woven together to form the fabric of a new development process'. It implies an action programme at the macro, mezzo and micro levels that ensures sustainable participation to create a participatory development process.

Meynen (1989) seeks to observe that the fisheries development, political mobilisation, and the issue of alternatives also subscribe to the same paradigm. But Meynen engages in an in-depth analysis of the political and technological responses that emerged from the below, and observes that, the technological options emerged from them are not necessarily compatible to the operational principles of the present production pattern. Moreover, it is argued that the 'traditional values' that are enshrined in the technological options are contextualised in different economic and social systems. So it does not find any relevance in the present policy formulations.

Ibrahim (1991), while attempting to understand the fisheries development, observes that the capitalist relations of production had emerged in the Kerala fisheries well before the introduction of mechanisation (that began with the INP). He argues that the exploitative methods of production and unequal patterns of income distribution were growing even within the

primitive system of low production then in existence. It is argued that by the 1970s it entered into the phase of industrial capitalism and thereby a greater integration to global capitalist system and world economy.

While discussing the export trends from 1840s, Shajahan (1987) brings out the difference between the demand structure prior to and after 1953 (the year INP starts its operations). He argues that the products in demand for the export markets closely resembled the local market and hence the technological dualism in the production process was absent during the pre-1953 period whereas the post 1953 period is marked with the introduction of new harvesting and processing technologies that catered to the emerging demands of the international market.

2.4.4 Thus this broad review of literature suggests that few studies that appear to really understand the intricacies of technological modernisation, as far as the fisheries development in Kerala is concerned. Most of these studies confine to the sectoral and temporal studies that overlook the broader context and social processes in which these developments take place.
Most of the studies on Kerala's fisheries development are 'impact studies' that broadly underline a technological deterministic position. They not only delimit the scope of enquiry from understanding the very forces that prompt for such an impact,

but also confine the possibilities of the democratic potential of the control over technology.

The most pertinent limitation of the studies that are reviewed in general is that, they assume that the fisheries development took place in Kerala in isolation. The need for an inquiry into the technological modernisation process of the fisheries in the context of the immediate social and political preoccupations is significant.

Chapter 3

Development of Fisheries in Kerala: Historical Background and the State Policies

3.1 The British Administration, with its overwhelming presence and the political and economic clout, could set the pace of modernisation across the subcontinent by the end of the nineteenth century (Gopalakrishnan, 2000). As far as fisheries is concerned, there were hardly any national level policy other than the Indian Fisheries Act of 1897, which enabled the provincial governments to frame and implement the rules and regulations regarding fisheries[1]. Nevertheless, the modernisation theory with its unilinear process of industrial development (Shin et al, 1997) prevailed as the core of the provincial attempts towards fisheries development. Thus, despite a centralised guidance, the State through its various agencies prompted a modern, scientific, and often commercially oriented model of fisheries development.[2]

It officially started with the establishment of an independent Fisheries Department in the Madras Presidency in 1907 (Jones, 1958). The Madras Presidency, which had the largest coastline in the country then through the South-East and South-

[1] The demand for a central fisheries organization to direct and co-ordinate the fisheries development was raised many times during the earlier half of the twentieth century. In 1938, for example, the Indian and overseas scientists who were at the Indian Science Congress Jubilee Session also mooted the idea, but in vain (Shah, 1948).

[2] The underlying principles of different agencies, however, did not vary much. For example, The Industrial Commission of 1916-1918 recommended that Scientific Officers should be attached to the Zoological Survey of India, to give advice to the local governments and other bodies on fisheries (Jones, 1958)

West coasts, had been a forerunner in fisheries research and development. Besides the Marine Experimental Station set up in 1908 at Ennore (which has later shifted to Tanur in 1914), an Experimental Fish Farm was started in 1914 at Tuticorin. Similar developments occurred in other provinces like Bombay and Bengal, too.

3.1.2 Other states engaged in similar activities include the princely state of Travancore which had formed a Department of Fisheries by the end of 1914 (Sugeetha, 1994). It laid the foundation of the state's role in fish industry and research in the area.[3] Such initiatives continued throughout the earlier part of the twentieth century, adding the impetus by a number of state fisheries departments and universities venturing into research and fisheries development.[4]

3.1.3 But the scarcity of food materials, particularly the shortage of fish, affected the Allied Forces stationed in India during the Second World War, and consequently led the British administration to take a keen interest in fisheries development. Moreover, the external dependence on food sources brought the

[3] A government initiated fish oil factory was soon started in 1917. The state of Travancore took many initiatives to accommodate the varying interests in the emerging fish industry. While introducing the modern systems of fishing and processing, it also set up fish workers cooperatives and measures pertaining to their socio economic upliftment (Sugeetha, 1994).

[4] (a) By then the development model of fisheries modernization has already been set. Wide ranging researches varying from biological aspects to the processing of fish have been carried out.
(b) University of Travancore (now University of Kerala) at Thiruvananthapuram started as a Department of Marine Biology and Fisheries in as early as 1938.

need for scientific approach to the judicious exploitation of domestic resources amongst the emerging Indian government also (Jones, 1958, James, 1989). In 1943, a memorandum on the post-war development of Indian fisheries was submitted by Dr.Bani Prasad and was endorsed by the Fish Sub-Committee of Policy Committee on Agriculture, Forestry and Fisheries in 1945. It recommended various measures for the development of fisheries including the establishment of Central Fisheries Research Institute. It stood as an initiative to the planned fisheries research and development through the 1940s and '50s. Soon, the National Planning Committee's Sub-committee on Fisheries prepared its report in 1946, which emphasised the modern and industrialised production of fish (Shah, 1948).

Simultaneously, a number of failed and partially successful attempts of mechanisation and commercial applications were also on, both by the private and state supported agencies, by the end of 1940's.[5]

3.2.1 The post-independence fisheries development has been a systematic progression on the ongoing modernisation experiments that kept abreast of the post-war emphasis on "Grow More Food Campaign' (FAO, 1993)[6]. Owing to the

[5] Both exploratory and commercial operations were attempted. The Travancore- Cochin government has gone to an extend of sponsoring a private company to do the activities (Sandven, 1959). Trawling experiments also were held since 1948 (James, 1989).

[6] The Second World War was instrumental in the deeper political and economic realignments. As far as the world fishery is concerned, the direct impact of the war was a two-fold increase in the demand.

influence of Socialist planning, the Indian State's control over the development process was substantial till 1980's. However, the development goal has been the pursuit of economic growth (Johnson, 2001). 'Modernisation, in the sense of increasing integration to the global capitalist economy, has resulted in a much more efficient fishery, capable of producing fish in quantity and quality sufficient for the world market' (ibid.). The State has sought technical assistance from international agencies and more advanced countries, promoted more domestic scientific research, and attempted to keep its pace akin to the transnational market trends.

3.2.2 Though the Constitution of India has listed Fisheries as a State Subject under the Item 21 of the Seventh Schedule of Article 246; Article 297 of the Constitution assigns the Central Government to exercise a coordinating role with respect to fisheries programmes. Moreover, the fishing and the fisheries beyond the territorial waters of the states are Item 57 in the Union List. Article 257 of the Constitution also gives property

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Due to the shortage of meat, people in general began to eat sea-food that resulted in the higher demand from across the various parts of the world (Shajahan, 1987). While discussing the post-War demand of prawn from the U.S., Kurien (1985) opines that the War-time shift in the population to the costal areas and the exposure of the armed forces into the fish eating South East Asian regions have altered the consumption patterns and that was coupled with the post-War prosperity resulting in the increased demand.

rights for the Central Government for anything that is of value underlying in the ocean within the waters of national control.[7]

In the administrative level, the Fisheries Division under the Ministry of Agriculture formulates the strategy of national development plan for the fisheries sector. Besides formulating the policies for fisheries resources management and industrial development, it provides technical and financial assistance for various state governments for fisheries development. As a later development, in 1988, a separate Ministry for Food Processing Industries that focus on marine fisheries development has been formed. The purview of the Ministry ranges from managing the institutions directly connected with the marine fisheries to planning programmes (like inshore fishing, deep sea fishing etc.), to processing, product development and training. Besides these, the state governments have ministries, departments, and directorates of fisheries to coordinate the activities in that level.

The post-independence fisheries development is marked with the State initiatives, spread widely across various plan formulations, programs, specific policy decisions, and legal enactments, though there is no all-encompassing policy approach or document. It was rather a complex process where varying actors like the State, private entrepreneurs, fish workers, trans-national ventures and consumption preferences etc. articulated

[7] The Central Government, at present, has the sovereign right to the waters up to the Exclusive Economic Zone. Quasim and Roonwal's book, *Living Resources of India's Exclusive Economic Zone*, 1998, is a closer look at India's EEZ, its resources potential and aspects of utilization.

their interests, often as the response to the immediate conditions. Thus, as far as the State is concerned, the Five Year Plans[8] become the sustained document of fisheries development, along with the international technical assistance programmes and specific administrative-legal initiatives. The development programmes at the state level had to be akin to the centralised plan processes and hence they hardly had any independent development policy (Achari, 1983).

3.2.3 Though the planned development of fisheries in Kerala[9] had formally commenced with the Second Five Year Plan (1956-61), the direction of development in tune with the national scheme was already set with other programmes, particularly with the commencement of INP in 1953 (Achari, 1994,). By then, the role of Technical Assistance Program (TAP) of the FAO, the Technical Cooperation Mission (TCM) of the U.S. and the Colombo Plan had become significant in India's fisheries development. These programmes corroborated with the emphasis and the preoccupation of the First (1951-56) and the Second Plans viz. modernisation of the indigenous crafts, introduction of

[8] Discussing the planning process is beyond the scope of the study. Rather it would look into the broad preferences the Plans set forth for the marine fisheries development. As the focus of the study is to understand the process of fisheries development in Kerala, it is attempted to look in to the State initiatives vis-à-vis Kerala's marine fisheries.

[9] The Kerala state has been formed on November 1 1956 as the part of linguistic reformulation of the states. Though it comprised of the 'amalgamation of three disparate parts' -Travancore-Cochin, the British Malabar and some parts of the Southern Canara- 'the people of Kerala share a common myth of origin and collective memory' that 'imparts a unique ethos to the Kerala society, not easily found in several other societies of India.' (Oommen, T.K, 1999)

the mechanised fishing boats, improvements in the fishing gears, establishment of infrastructure facilities like processing plants, cold storage facilities, ice plants etc. and organisation of marketing facilities (Plan documents; Panikker, 1958; James, 1989; Sandven, 1959). It is argued that the 'most important contribution' of the TCM programme was the exploratory fishing in the Indian seas (Panikker, 1958), of which the Government of Travancore-Cochin had also received three medium sized Japanese-built exploratory fishing vessels in 1955 (Sandven, 1959). On the other hand, the INP[10] was designed to be the part of Community Development Program[11] that envisaged socio economic upliftment through technical assistance (Klaussen, 1968). Unlike most of the other ongoing programs, it had a territory of operation where it was directly involved with the fishing activity and the community. The INP and its impacts are unequivocally the most discussed among the programmes of Kerala's fisheries modernisation across the academic and the

[10] On October 17th, 1952 the Government of Norway, India and the United Nations signed a tripartite agreement. It was agreed that the Government of Norway would assist the Government of India in carrying out a programme of developmental projects to contribute to further the economic and social welfare of the people of India. The Supplementary Agreement signed on 24th January, 1953 gave shape to an Indo Norwegian Project for fisheries and fishermen community development at three fishing villages of Neendakara, Puthenthura and Sakthikulangara in the then Travancore - Cochin State. Klaussen (1968) discusses about the Project and its functioning in detail. One of the earliest discussions about the Project is done by Gerhardsen (1958).

[11] Community Development Programme launched by the Government of India (GOI) in 1952 was aimed as a means of socio economic upliftment of the rural poor. Largely influenced by the Gandhian ideals of rural reconstruction and similar earlier experiments, the projects spread across the country emphasizing development program taking account of grassroot conditions. 'It had a minimum programme for developing rural industries which included the supply of improved tools to traditional artisans, training artisans to improve their skill, granting loans and subsidies to village artisns to carry out their works' (Asari, 1982). The successful experiments in India prompted many African, Asian, and Latin American countries to adopt it as a development policy (Ian Smillie,2000).

activist debates.[12] It is widely argued that the INP 'paved the way for mechanisation of fishing effort and the use of trawl nets for fishing along the Kerala coast (George, 1988).

The state government policy of encouraging mechanisation continued as it established integrated fisheries complexes after the completion of INP in 1963. Assisted by INP itself, the integrated fisheries complexes across the three different centres attempted to develop harbour facilities, boat repair and maintenance, and introduction of power vessels for commercial fisheries. As the domestic and international market conditions were congenial, it was well received and developed by the private sector. At the same time when several similar experiments were on, the Central Institute of Fisheries Technology was established in 1957. The activities of the Institute comprise research and extension education in the fisheries technology. It included fishery craft, fishing gear, processing, biochemistry, microbiology, engineering, electronics, and statistics (Kandoran, 1989).

The Third Plan period (1961-66) marks a greater emphasis on the introduction of mechanised boats and adoption of synthetic materials for fishing gear. On the onset of the 'pink gold rush' a large share of the state's plan expenditure was allocation of the production orientation schemes like financing for mechanised boats, development of supporting infrastructure, and providing training facilities (Kurien, 1985). Due to the

[12] See. Kurien, 1985; Kurien and Acahri, 1988; Aerthayil , 2000 etc.

tremendous export potential identified, the private sector also had invested largely on the production and the post-production activities. Liberal financial incentives were provided to the private sector by the state to augment the foreign exchange. At the national level, exploratory fishing, and programmes for human resource training were intensified. Some programmes like the GOI's attempt to have joint ventures in export-oriented tuna fishing initiated in 1965, could not have gained much results (Chidambaram, 1989). On the other hand, the development policy proposed the upliftment of the living conditions of the fish workers through modernisation (Kurien and Paul, 2001). Moreover, there was an emphasis on setting up cooperatives and providing credit facilities for the artisanal fish workers, to disseminate the new technology and its benefits. Social Security measures aiming at the upliftment of the living conditions of the artisanal fish workers, though marginally, have been enunciated during this period (ibid.).

The following plan periods, comprised of the Annual Plans from 1966 to1969 and the Fourth Five Year Pan (1969-74), also had predominantly emphasised on increasing production aiming at the maximization of the export induced foreign exchange. The schemes for deep sea fishing vessels were initiated in1968 with its subsequent emphasis in the following years, particularly through 1971, 1973, 1977, and 1981 along with joint ventures and charter fishing. Besides import, the construction of the vessels was also

encouraged during this period. Mechanization of boats, and exploratory surveys were further intensified and pre-investment survey for the construction of fishing harbours and landing centres were also taken up. The establishment of Marine Products Exports Development Authority in 1972 has become a landmark in the export promotion activities. Designed as a statutory agency, it is made responsible for planned and regulated development of India's marine products export. It is aimed at enhancing exports through increased production, hygienic handling and processing, and by employing advanced technology (Jagdees, 1989). The agency has subsidy schemes for artisanal fish workers in fitting outboard motors (OBM) to their unmechanised crafts for increasing the productivity. It also undertook transfer of technology training programmes to the workers who have had lesser expertise in employing the new technology (ibid). The most significant policy initiative at the state level during this period was the Master Plan for the Fisheries Development brought out by the Government of Kerala (GOK) in 1969. It envisaged a four fold upscaling of production in the next twenty years. It emphasised largely on trawling and mechanised fishing for augmenting production. Moreover, developing the processing and allied activities were also given prime importance. The development is understood through more fishing harbours, landing centres, ice plants cum freezing plants, boat building yards and workshops, net making factories etc. It proposed the

setting up of Fisheries Industrial Estate and wireless stations along with better transport and communication facilities. Housing and water supply schemes for fish workers also were addressed.

During the Fifth Plan (1974-79) and the Annual Plan (1979-80) followed, it attempted at diversification of fisheries production, where providing added nutrition for the country's population also had been aimed at. Exploratory Fish Projects were strengthened for carrying out deepsea explorations. The most significant policy change occurred during this period is the declaration of Exclusive Economic Zones (EEZ) as per the treaty under the Convention of the United Nations Third Conference on Law of the Sea in 1976.[13] The enactment of The Territorial Waters, Continental Shelf, Exclusive Economic Zone and the other Maritime Zone Act of 1976 defined the area demarcations of the coastal zones. Immediately in the next year, the GOI introduced the scheme for chartering the foreign vessels particularly to enlarge deep-sea fishing in the EEZ. Moreover, it aimed at finding out the suitable craft and gear and possible technological transfers. During the same period, purse-seining was introduced in the Kerala coast with private initiative. Thus, the waters become a contending area where trawling, purse-seining, ring seining, and artisanal fisheries existed inharmoniously. Moreover, many academic and administrative

[13] The international order extends the economic jurisdiction of the Coastal countries to an area ranging from 200 to 350 miles from the coastline. According to this, India is endowed with an exclusive right to utilize the living and the non-living resources spread across about 2.02 million square kilometers (Ocean Policy Statement, Department of Ocean Development, http.dod.nic.in).

studies pointed towards the rampant and unsustainable overexploitation of the inshore fishery resources. Ref Due to the agitations held by the fish workers, who have been seriously affected, the state government has reserved certain distance in the costal waters exclusively for artisanal fisheries.[14] In the meanwhile, the GOI has appointed a committee to study the frequent conflicts among the artisanal, mechanised, and deep sea fishing (Vijayakumaran. and Haridas 1998). On the basis of the study, the Ministry of Agriculture prepared a model bill on marine fishing regulation act in 1979 and it was circulated among the states for appropriate legal interventions (ibid). The state government enacted the Kerala Marine Fishing Regulation Act in 1980, which upheld the previous restrictions on mechanised fishing.

The Sixth Plan (1980-85) continued most of the preoccupations of the preceding plans, but for the added emphasis on the development of artisanal fishery. It also intensified the export promotion measures by facilitating funds for large trawlers and its infrastructure like fishing harbours. The added emphasis was on social security of the fish workers (Kurien, and Paul, 2001) and the motorisation of the country crafts. Exploratory survey of the deeper areas for oceanic tunas and deep sea fishes were also given importance.

[14] The state government restricted mechanized fishing from the costal belt up to 20m depth north of Edava (Kollam) and 30 meters depth, south of it, on the basis of oceanic specificities. Purse-seining, ring seining, and mid water and pelagic trawling were legally banned in the territorial waters of the state.

The GOI enacted The Marine Zones of India (Regulation of Fishing by Foreign Vessels) Act in 1981 that set the rules for the operation of different types of fishing in the different zones, particularly to restrict the foreign vessels from exploiting the regulated inshore areas. Later, the government issued a directive against 'bull trawling' within the 40 meters depth also.

In Kerala, besides the Marine Fishing Regulation Act[15], the government enacted the Kerala Fishermen Welfare Societies Act in 1980 to facilitate fish worker's organisations at the grassroots level in lieu of the defunct cooperatives functioned earlier. Two expert committees headed by Mr. Babu Paul and Mr. Kalawar[16] set up in 1981 and 1985 respectively, also have attempted to understand the then prevailing fisheries crises and devised better conservation and management of fishery resources. As far as the fish workers are concerned, the social security system was institutionalised[17] during this period (Kurien and Paul, 2001). An increase of 381% is marked in the amount spent on social security measures during 1981-85 (ibid). Initially set up as Kerala

[15] The Marine Fishing Regulation Act of 1980 is argued to have empowered the state too prohibit, restrict, and regulate fishing so as to conserve the fishery resources and to protect the interests of the traditional fish workers. The government could device many management measures like ban on purse-seining and trawling during night, zonal restrictions for mechanised boats, registration and licensing for fishing etc. on the basis of this legislation (Vijayan and Kurien.).

[16] Taking exceptions to the ongoing development spree, the Kalawar Committee even recommended reducing the number of trawl boats one third (GOK, 1985).

[17] Responding to the increasing consciousness among the fish workers on their marginalization, the government proposed the institutionalization of the social security arrangements. Though the government could take notice of the deplorable condition of the fish workers, a techno economic solution other than the prevailing forms like the subsidies for mechanization and so, was beyond its immediate agenda, as the mechanized sector, particularly the trawler owners, were a powerful lobby. Nevertheless the political pressure of the fish workers was also massive. The government resorted to the social security measures as an easy way out (Kurien and Paul, 2001).

Fishermen Welfare Corporation, it led to the formation of Kerala State Cooperative Federation for Fisheries development (Matsyafed) in 1984, by clubbing it with Kerala Fisheries Corporation and Kerala Inland Fisheries Development Corporation. Matsyafed aimed to provide technical assistance mainly to the fish workers. In 1985, the Kerala Fishermen Welfare Fund Act was passed and Kerala Fishermen Welfare Fund Board (Matsya Board) was formed. Both Matsyafed and Matsya Board along with the State Department of Fisheries undertook the social security programs that include the measures for healthy livelihood[18].

The direction of the Seventh Plan (1985-90) was keeping in tune with the ongoing developments with the fishing sector. Besides promoting prawn farming and hatcheries, it emphasised the further development of deep sea fishing fleets by means of local manufacture as well as imports. The programmes for the motorisation of the country crafts were continued. It took special initiatives in the diversification of the food products and strengthening of domestic market. The most significant administrative change occurred during this period was the formation of a new ministry that deals with food and processing industries, in October 1988. The plans, programmes, and the

[18] It included facilities and assistance for better housing, alternate jobs, education to children, sanitation, training, and special programs for women.

institutions directly related to marine fisheries are set under the purview of this ministry.

In the state level, the most significant development during this period was the beginning of the ban on trawling during the monsoon months in 1989 following the recommendations of the Balakrishnan Nair Committee[19]. The social security mechanisms continued in its expanded pace that stated in the early 80's.

The Eighth Plan period (1990-95) marks the liberalisation phase of the Indian economy. As most of the other sectors, fisheries also has undergone the liberalised regime. Though the Ministry of Food Processing Industries have been actively promoting deep sea fishing since its inception, the Deep Sea Fishing (DSF) Policy, announced by the GOI in March 1991, has given a new impetus to the ongoing development. The international treaty of Exclusive Economic Zone has also become operationalised from 1994. Other plan preferences have remained the same as the earlier periods. Aimed at expanding the fish production and export earnings, the DSF policy has allowed the Indian entrepreneurs to enter into joint ventures with technically enhanced foreign entrepreneurs to exploit the marine resources beyond the inshore waters. The GOI instituted a Technological Mission that conceived a programme to introduce

[19] The Balakrishnan Nair Committee (1989) had recommended an experimental ban on trawling during the monsoon months. As a committee set forth on the wake of the growing resource depletion and the socio economic problems associated with it, it recommended to monitor the ban for three consecutive seasons (years) and incorporate the findings in the future course of planning.

more than 2,600 deep sea fishing vessels during the same period. Liberal economic incentives were also allocated for the program.

On the other hand, at the state level, the production oriented development policy could not be sustained beyond the 1980s as the grassroots pressure, particularly from the organized artisanal fish workers, were mounted enough to evolve a more representative fisheries development policy.

The Fisheries Development and Management Policy of 1994 in the state has emerged as a result of this. It is a landmark policy initiative from the angle of fish workers as it gives emphasis on 'aquarium reforms' that is accorded with the fishing right to fishers, like land to the tiller. It mooted the concept of **matsya bhavan** at the primary level and resource management committee at district level. It encompasses women's participation in the resource management and measures for conservation of resources.

During the following years, the Planning Board of the state came out with certain other measures, particularly aiding the fish workers.

During the Ninth Plan (1997-2002), the priority areas mostly remained the same. Besides the plan formulations, certain other policy documents also reflect the pace and development of fisheries technology and development. The Agricultural Policy of 2000 envisages an integrated approach to marine and inland fisheries, particularly aquaculture, to increase domestic food

availability and exportable surplus. Deep sea fishing, according to the document, would continue to be a thrust area along with the berthing and landing facilities, development of market infrastructure etc. It also envisages to incorporate and encourage the advancement of technology. The Ocean Policy Statement brought out by the GOI during the same period also urges for basic marine science and technology to be encouraged for the utilisation and the preservation of marine environment.[20] The evolving National Biodiversity Strategy would involve costal and marine areas also and it would look into the 'ethical, cultural, scientific and economic dimensions including the right of species, ecosystem to survive, the primacy of survival and livelihoods based on biodiversity, various cultural ways of relating to the nature, the role of biodiversity in economics and technology etc.'

In the state, during the same period, two committees were setup. The Balakrishnan Nair Committee that submitted its report in 2000 urges for the conservation and protection of fish resources. After analysing the data of past one decade of experimental trawl ban, it reveals that the monsoon trawl ban was beneficial to augment the conservation and protection the fish

[20] The Ocean Policy Statement avows in its items 9 and 10 that 'much more needs to be done for the indigenous technology for the exploitation of fish from the deep waters. This is also mean setting up of infrastructure facilities and services to operate large sized fish vessels.' 'An important component of the development programme should be acquisition of technology. To be self reliant, such technologies would have to be largely developed, tested and operated indigenously. Technologies relating to instrumentation of diving systems, position fixing and position maintenance, materials development, oceanic data collecting devices, anti-erosion capabilities for submersibles, energy and energy-saving devices are priority items. Several new technologies are to be commercialisd and made cost effective.' dod.nic.in

resources. Hence, it recommends 3 months ban of trawling and other destructive gears during monsoon.

The Aquarium Reforms Committee instituted in 2000 under the chairmanship of Mr. K. Ravindran looks into the various aspects of aquarium reforms.[21] Other development preoccupations of the state remained the same. In February 2002, the GOK has brought out a draft fisheries policy for wider discussions, keeping in line with the recent changes that take place in the fish producing countries. In consideration with globalization and privatization, the document put forwards game fisheries, fisheries tourism, oceanariums, aquariums, farm-house tourism etc apart from the proposals for further privatisation and commercialisation of fisheries activities.[22] It is, at the proposal level, have hardly any inclination towards the implementation of the earlier policy of 1994. It rather keeps abreast with the present market situations. Precisely hence, the discussions are still on without much consensus.

3.3.1 Modernisation, particularly technological modernsation, remained as the development policy of the marine fisheries sector in India. Hence, the major share of the plan outlays was spent on

[21] The Ravindran Committee is yet to submit its report.

[22] It is the first time that the government is placing a policy draft document in the public for a wider discussion, as far as fisheries is concerned. It is due to the political pressure involved in the issue. The Department of Fisheries has already organised regional level discussions with various stakeholders. The policy is still pending.

the development of marine fisheries industry, and the research and technological options that facilitated the fisheries industry. Economically, it resulted in increased production[23]and higher returns in the form of foreign exchange.[24] As a result, fisheries became a vibrant industry in the domestic sphere. From traditional caste-bound occupation (Kurien, 1985), it has emerged to be a modern economic activity, which operates in a public domain of the market.

3.3.2 But a section in the fisheries sector, numerically the overwhelming majority of about 1,70,000 (Kurien and Paul, 2001), viz. the artisanal fish workers, could not keep the pace of the industry and the studies prove that they have undergone further marginalisation[25] as a result of modern mechanised fisheries activity (Asari, 1982). Their share of production, particularly by means of non-mechanised crafts, has reduced from almost a total production in 1940 to a mere 13 % in 1997 (Sathiadas, 1998). Their incomes have declined and the quality of life remained the same or even gone worse (Peppin, 1986). Employment opportunities and income distribution have resulted in a growing proletarisation of the non-mechanised workers

[23] Refer the table at the appendix.
[24] The export earnings from fish and fish preparations accounts for 1180.1 million (US$) in 1999-2000(RBI, 2000).
[25] It can be argued that artisananal fish workers have always been among the marginalized sections in the society, across the Indian states, across the history (Kurien, 2000; Mc Pherson, 1993; Woodcock, 1967)

(Kurien and Mathew, 1982,DOC.4.)[26]. Moreover, the planned fisheries development has altered the consumption preferences (Kurien, 1985) that had drastic impacts on the lifestyle and employment pattern of the artisanal fish workers.

3.4 The responses emerged out of the process of fisheries development that differentially equipped the different sections can be broadly categorized into three, viz. political, economic, and technological[27]. All the major actors, viz. the State (administrative, legal, and scientific activities), the merchant capitalists-entrepreneurs (from the local agent to entrepreneurs to large trans-national industrial concerns) and the arisanal fish workers (who are mostly into small scale fisheries), have not only had different rationale and expressions in the political spectrum, but as individual actors, kept their political positions dynamic also, according to the changing tunes of the industry.

3.4.1 The collective political response explicitly emerged from fish workers since late 1970's. The artisanal fish workers perceived the ongoing technological modernisation as against their interest, and on this pretext, there were many incidents of physical violence between them and mechanised and trawler

[26] It is widely argued that the benefits of the increased output, both in volume and value, are accrued mainly to the mechanized sector. Even in that, the workers benefited only very little as the bulk of the surplus accrued to private entrepreneurs (Kurien and Mathew, 1982)

[27] This categorization attempts to draw very sketchy borderlines, as we find in the later analysis that a particular political response does mean an intrinsically interwoven economic and technological options, and vice versa.

sections (Vijayan, 1987). It was chanalised as non-violent political actions equipped for collective bargaining (Kurien, 1990). On the other hand, the merchant capitalists-entrepreneurs have engaged in very rare explicit political interventions[28]. The development policy quite often reflected their interests[29]or mostly they have created the paths of fisheries development, wherein the other actors have merely been equipped to reflect on it or follow it.[30]

3.4.2 The economic response of the merchant capitalist-entrepreneurs were tremendous, where as artisanal fish workers could only partially take part in utilising the emerging economic opportunities (Mathew, 1986).[31] Even the efforts laid by the government on behalf of their cause could not attain its expected results (Hakkim, 1980).

3.4.3 The questions of technology in fisheries have always been closely linked with the producers, process of production, and consumption. The technological modernisation has intrinsically involved certain process of production and designs of

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[28] One such occasion is the legal challenge they have proceeded against the GOK During early 1980s when the government responded to the fishers demand for the banning of purse-seines in the Kerala coast, the Purse-seine Fishing Boat Owner's Association has moved to the Kerala High Court on the grounds that the government action stand on their way of their fundamental rights to livelihood. The Court conceded to their plea, on some technical grounds, and was later nullified by the Supreme Court (Kurien, 1988).

[29] Or rather they were better equipped to respond to the emerging economic and political conditions.

[30] In the case of exports, for example, the merchant capitalists-entrepreneurs found unique ways of expanding their markets.

[31] For instance, Sebastian Mathew (1986) writes how the high profit margin of the dry-prawn trade prompted the migration of Muslim Merchants from the Kutch region of Gujarat to Kochi during the early 20th century. But the fish workers remained under the mercantile class long since the history without improving their life chances (Ibrahim, 1993; Mc Pherson, 1993).

consumption that would be catered by a particular section of producers. The State-promoted fisheries development has supported a merchant capitalist-entrepreneurial class who could reap the benefits of technological modernisation at its optimum. On the other hand, the artisanal fish workers who have traditionally been predisposed to fisheries were mostly unable to keep abreast with the process of technological modernization and the expansion of market associated with it. Though they did not have a uniform pattern of response, the major responses can be overlappingly categorised as

(1) adapting new technology,

(2) partial identification with mechanisation, and

(3) bringing out alternative/intermediate technology.

All these processes have happened in the fisheries sector of Kerala according to varying responses of the fish workers to the emerging situations. In order to observe the process closer, this study attempt to examine the experiences of an organised form of collective response that stood close with the ideological and pragmatic orientations of the KSMTF that spearheaded the movement of fish workers in political and technological interventions in Kerala fisheries from late 1970s onwards.

3.5 The SIFFS Experience

3.5.1 South Indian Federation of Fishermen Societies (SIFFS) is the apex body of a three-tier structure of autonomous

organisations of small scale fish workers spread across the costal states of Kerala, Karnataka, Tamil Nadu, Pondicherry and Andhra Pradesh. Functioned in the pattern of cooperatives, it has about 100 village level organisations of about 8000 members affiliated to it across this area. The primary level institutions that cater to the credit and marketing requirements of the members are monitored and assisted by the independent district-level federations. The apex body focuses its attention on technology for small-scale fish workers and assists in the co-ordination and management of the district level federations, involves in Research and Development, and technological dissemination (Vivekanandan, 2002). It also conducts studies on the areas of its operation.

The technological development and dissemination spearheaded by the SIFFS can be broadly classified into five categories (SIFFS, 1987; Annual Reports, 1993-1999; Vivekanandan, 2002);

- Alternative fishing craft development
- Research and training in alternative propulsion methods
- Out board motor training programme for fish workers
- Artificial reef programme and fish aggregation devices
- Other associated areas (Navigation, communication and safety equipments, wheel house, ice boxes, drying implements etc.)

3.5.2 Alternative fishing craft development project that the SIFFS has undertook in 1983 originated from the works of Kottar Social Service Society under the leadership of a Belgian engineer, Pierre Gillet. It evolved due to the shortage of timber in craft's production and the search for an intermediate craft that enhance the productivity. With the technical and financial assistance from the Intermediate Technology Development Group[32], UK, it makes use of marine plywood, and design according to the demands and the prevailing models of boats in each locality. It has received instantaneous response from the fish workers across the South-West coast of India (SIFFS, 1987); even private initiatives imitate the SIFFS model widely (Vivekanandan, 2002).

The alternate propulsion methods include the conversion and the modification of the out board motors and other auxiliary equipments to be conducive to the new plywood boats. It also involves the indigenous development of the engine and alternative sail (SIFFS, 1987).

The outboard motor training programme is to assist the fish workers to keep abreast with the changing technological changes associated with motorization. The government agencies like CAPART and state governments have funded SIFFS in conducting the training programmes (SIFFS, 1987).

[32] The Intermediate Technology Development Group (ITDG) was started in 1965 at London under the leadership of E.F.Schumacher..

The artificial reef programme of the SIFFS has been the coordination of the conservation methods evolved from the people themselves and the experiences shared from elsewhere.[33] Due to the immediate attention it received, the State governed CMFRI has involved in the monitoring of the artificial fish reef set up by SIFFS in Valiyathura ((SIFFS, 1987, Annual Reports).

The Society is involved in the research and development of associated areas like navigation, communication and safety equipments, wheel house, ice boxes, drying implements etc. The notable features of the technologies that are employed in all the areas are that its immediate proximity with its users and the value addition of the production process are through affordable means.

3.5.3 The technological innovations and assistance the SIFFS imparts for its members broadly imbibe the ecological and traditional mooring the movement attempted to propagate. So it cannot be seen in isolation with the political and technological interventions fish workers attempted. At the same time it kept abreast with the pragmatic problems of the day too.

While discussing on the external technologies and technological transfer, citing the SIFFS illustration of adopting the plywood boats and the artificial reefs, Ian Smillie (2000) observes that 'one external technology had changed life for ever

[33] The artificial reefs (Artificial Fish Habitats) –evolved in the 17th century Japan, in U.S.150 years ago, and now used in Thailand, Philipines, Indonesia, Srilanka, Maldives etc.(D'cruz 1995). It is operationalised in different forms across Asia, Africa, Europe, North and South America (ibid).

along the Kerala Coast, while two others helped the poor families to cope up with the damage"[34]. Smillie further adds that the solution of the present fisheries crises in Kerala could be meted out through appropriate technological choices.[35]

Mc Robie (1991) while analysing the reasons for the success of the plywood fishing boats in SIFFS, and similar experiments of appropriate technology cites three reasons as unique with the appropriate technologies;

1. The technology themselves have been thoroughly field tested and refined before going into production. The technologies lend themselves to local manufacture wholly or in part, and to local maintenance, and are cheap enough that they are affordable to individuals or working groups of the 'target' population.
2. The users or the beneficiaries of the technology are closely associated with the process of selection, introduction and the use of the technology or the product; and from the stand point of users, the advantages significantly outweigh the cost incurred by them.
3. The technologies are disseminated though the mechanism of the market (with credit enabling mechanism to adopt the technology).

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[34] The damage causing technology in the reference is its obvious denotation on INP.

[35] '.....with scientists now studying the effects of their artificial reefs, an old indigenous technology may have an important contribution to make in finding a solution to the sustainability of livelihood and the Kerala fishery' Ian Smillie (2000)

Thus, as mentioned, the issues broadly debated under the technological studies are encompassed in the area of fisheries development and the technological responses emerged at a later phase of technological modernisatiion.

Chapter 4

Towards Understanding Technological Modernisation and the Response

4.1.1 The technological modernisation occurred in Kerala fisheries was deeply rooted in the transition that was taking place in the epistemic order of Kerala society. It is closely linked with the advent of colonial modernity and the changes that followed in the institutional structures, productive forces and produces, and the terrain of knowledge. This, as a whole, created a semiotic sphere wherein the discourses and the technologies of modernity could flourish. The pattern of development that occurred in the state through out the twentieth century is marked by this historical transition with the dominant social forces akin to this process of modernisation have set the dominant discourse of development in the state.[1]

4.1.2 The trade with the West Asia and Europe was widely established during the pre-modern days in Kerala. In the absence

[1] While discussing the development experiences of Kerala, Oommen, T. K.(1999) observes that, '...the material fruits of development barely trickle down to the traditionally disadvantaged-Adivasis and Dalits- notwithstanding the gains in the socio-political realm.' It is corresponding with the development experience of artisanal fish workers as well. On the human development achievements of Kerala, Ramachandran (2000) cites the evaluation of Michael Tharakan on the literacy campaign that shows the persistence of illiteracy among the disadvantaged sections of the Kerala population, viz., the schedule castes and tribes, the poorest among the agricultural labourers, fishing communities and among Muslims(particularly women).

of the peculiar trading caste, the Syrian Christians, the Jews and the Muslims had a major role in the external trade (Narayanan, 1999). This 'cultural symbiosis induced by the extraordinary conditions of maritime trade and commerce' (Narayanan, 1999).

With the arrival of the Portuguese in the 16th century, the economic, social, political and cultural status of the Christians has undergone a tremendous change and they became the vanguards of modernisation through their promotion of press, schools, colleges and the technical education.[2] It stimulated the organisational and reformist tendencies in the other communities, particularly among the lower segments of the society.

The political and the economic ends of the colonialism has aided in subduing the feudal and caste operations in the economy and the society (Narayanan, 1999). Missionary influences in the early phases of development in education, health, printing and the subsequent spread of the press (Oommen, T.K., 1999) have a major role in the modernisation process. Though the pre-colonial society was a monitised economy, barter system continued to be 'the common mode of exchange in the villages' (Gurukkal, 1999). As the cash economy and competitiveness replaced the feudal entrenchment, new technologies began to be welcomed (Narayanan, 1999).

[2] The protestant missionaries started their activities during the earlier part of the nineteenth century. started schools wide across Kerala. (Gopalakrishnan, 2000).

Thus, the Nineteenth century Kerala history is remarkable for the initiatives with modernist perspectives even though the reverberations (including printing press, book publishing, steam boats, pistols) of the European enlightenment and the industrial revolution were appeared much prior to that (Gopalakrishnan, 2000). Moreover, the prominence of the British opened the cultural and economic hegemony of colonial capitalism.[3]

Thus the historical transformation of the traditional epistemic order opened up a new regime of meanings and visibilities- the discourse of colonial modernity. Gurukkal (1999), for instance, argues how seemingly different sites like evangelism, schooling, printing press, economy, colonial administration and its reforms along with the reformist movements of nineteenth century Kerala, have been discursively united in a common epistemic foundation.[4] He observes that 'the colonial process represented a myriad of strategies, objectives, institutional structures and technologies which as a vast terrain of knowledge/power relations could set in the historic transformation of the traditional epistemic order'. (Gurukkal, 1999). He further observes that, 'through the various forms of

[3] It was during the nineteenth century that the relations of production and the products have transformed akin to the world market, and the production priorities have gravitated towards the cash crops like coconut, rubber, coffee and tea. (Gopalakrishnan, 2000).

4. The Missionaries were the vanguards of modernity. Their activities did not confine only to education through schooling. Rather it kept abreast with the Modernist preoccupations, for instance, the Basal Mission that has started an English medium school at Kannur in 1841 and a primary school in 1848 at Kozhikode and another at Talasserry in 1856, was instrumental in setting up textile factories in Kozhikode and Kannur during 1860s. The first tile factory in Kerala was set up at Kozhikode during 1873.

institutionalisation, types of objectives, systems of differentiations, meanings of generating power relations and degrees of rationalization, the colonial powers transformed the people as subjects of modernity'. (Gurukkal, 1999). And hence, the social reform movements and organizations formed by the end of the nineteenth century and the beginning of the twentieth century were the harbingers of modernity wide across the social spectrum of Kerala.[5] And it is in this epistemic phase that the fisheries development with the emphasis on technological modernisation emerged in Kerala

4.2 In the above historical background, this part attempts to contextualise the issue of fisheries development that took place in Kerala in reference to the social constructivist perceptions of technology. As the previous chapters argue, the question of technology has been deeply linked to the patterns of production and preferences of consumption, which were heavily mediated by the State. Thus, the role of national policies and international developments, particularly the impact of global fisheries economy, have a major stake, along with the changing internal dynamics of the domestic sector, in bringing about the technological modernisation in the Kerala coast.

[5] It included the Channar Rebellion of 1865, the 'Malayali Memorial' of 1891, the Sree Narayana Dharma Paripalanasangham started after the leadership of Sree Narayanaguru in 1903, Sadhujana Paripalana Sangham by Ayyankali in 1905 and Sahodhara prastanam initiated by Sahodaran Ayyappan in 1917.

Technologically, this involved three distinct actors with their peculiar 'technological frames' [6]: (i)the State as a representative body of varying interests and social actors; but ruling class as a configuration of feudal landlords, industrialists and the urban intelligentsia in the wake of Independence (Swamy, 1994), (ii)the merchant capitalist entrepreneur class largely drawn those from 'outside' the spectrum of fisheries, and (iii)the artisanal fish workers who have been traditionally engaged in fishing activities(from production to distribution).

Each of these major actors has tried to converse the technological perceptions within their semiotic boundaries. It included various aspects like the debates over indigenous and exogenous technologies, technological diversities and homogenisation, adoption, rejection, and control of technology and technological alternatives.

These issues, in the light of the previous understandings, would facilitate to approach the debates on technology more closely.

4.2.1 As argued earlier, by the beginning of the twentieth century, the institutions of governance[7] widely kept abreast of the

[6] Bijker's (1987) notion of 'technological frame' is 'intended to apply to the interaction of actors'. It is 'the repository of knowledge, cultural values, goals, practices and exemplary artefacts shared by a social group, which structures their attribution of meaning to objects and process in the technological innovations and their subsequent actions' (Brey, 1997).

[7] In the region of Kerala the institutions of governance were the princely states of Travancore-Cochin, the Madras Presidency, and the southern Canara of the state of Mysore.

economic, political and social aspirations[8] of colonial modernity to address the modern concepts of progress and development. Though there were isolated attempts of modern scientific enquiry[9] and expanded marketing efforts[10] prior to the twentieth century that made a clear influence on the fisheries development later, it was during the first decades of the twentieth century that the institutional mechanism of modernisation emerged in the sector.[11] The State-initiated fisheries development commenced from this period with its deep-seated modernist preoccupations.[12] This modern perspective remained as the guiding ideology of the development continuum throughout the following decades.[13] After independence, the Five Year Plans, specific programmes and policies etc bear the stamp of this continuum though most of them were derived out of the imminent market conditions, particularly of the international demand. Moreover, the GOI had 'secured' the technical assistance from FAO, the U.S.

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[8] Factories and industrial establishments were set up for economic development (for instance, Travancore was ahead of many Indian states in the frontier areas of the industrial technology like fertilisers, minerals and chemicals and there is a decline is apparent industrial index of the state after independence). Political institutions modelled on the western counterparts evolved. Malayalee identity and movements for the democratization of the society took deep roots into the society. Social awakening against the ills of the then prevailing society were raised , as per the modern understanding.

[9] Mostly from the East India Company officers like Russel and Hamilton Buchanan to Francis Day, Seymour Sewell, Alcock, Anderson, Stanley Kemp and Hora – mostly under the aegis of the Marine Survey of India, and Zoological Survey of India- have collected voluminous information on the marine fauna (James, 1989).

[10] Francis Day (1865) writes about the fish oil exports that took place from Malabar during the mid-nineteenth century.

[11] Particularly it commenced with the setting up of the State Fisheries Departments during the first two decades of the twentieth century.

[12] For instance, two of the major tasks of the Fisheries Department formed by the Travancore Government in 1914 were to conduct scientific investigations and the development of fish industries (Sugeetha, 1994).

[13] Institutions, research and market were set in this continuum, though with varying emphasis across the times.

Government, and the Government of Norway (in the form of INP) during the initial years of planned development in different fields of modern fisheries.[14] Each techno-economic programme that took place in the fisheries development throughout the twentieth century Kerala fisheries, other than the accommodation of the technological interventions from the grassroots during the 1980s and later, had its direction of this technological modernisation, set in the earlier half of the twentieth century.[15]

4.2.2 The role of the market has always been a determinant in the technological options. The variations of the targeted consumers involved inherent technological bias not only in the processing technologies but also in production. As the preferences of certain species of fish would certainly escalate the possibility of certain technical options that result in the optimum production[16], the technological options employed in the production of the less

[14] This transnational technical assistance is to be seen in the light of the fisheries development programs taking place then. As the Fisheries Development Advisor to the GOI, N.K. Panikker observed, that this was a part of the modernizing efforts of the fisheries envisaged in the plans, ingrained in the training and the research facilities (Panikker, 1958).

[15] It is no way arguing that the pace and intensity of the technological modernization process were uniform throughout. But major later day developments like trawling, purse-seining, deep sea fishing etc had its conceptual and exploratory beginnings during the earlier phase.(For instance, trawling was first experimented in 1900s (Kurien and Mathew, 1982) and Purse-seining was experimented in 1958-59 with promising results (Per Sandven, 1959). The market conditions and conducive state directions only facilitated the process later on. (Discussions on the accommodation of the technological interventions are to be dealt later).

[16] Optimum production not necessarily means the minimum per unit cost of production. If the volume of production is technically equipped to contribute more to the net profit, a higher cost per unit may become a secondary consideration in a market rationale. The advantages of artisanal fishery over the mechanized sector are also argued on the grounds of economic feasibility as well (Kurien and Willmann,1982; Kurien, 1987). But the market's preference on mechanized tools also may be due to the higher volumes of production it contributes to the market per unit as compared to a unit of artisanal production.

preferred species consumed by the less preferred consumers[17] tend to get obscured by the operational principles of the market.

The role of the trans-national markets wielded a considerable importance in the fish economy even prior to the commencement of planned development, and the most underlying inspiration behind the technological change was the expansion of the market.[18]

4.2.3 The role of the international agencies in the course of Kerala's fisheries development (or rather Indian fishery in general) is significant since the wake of planned development.[19] It is primarily due to the peculiarity of the fisheries economy and, to an extend, due to the questions of access to the oceanographic resources. It manifested in setting the direction of market operations at one end and for the formulation of global market

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[17] Kurien (Kurien, 1985, Kurien, 1987) clearly demonstrates how the export oriented development model has altered the production preferences of the fish that resulted in the decline in the local consumption of fish.

[18] (a) Francis Day (1865) while discussing the fish oil exports from Malabar during the mid-nineteenth century casts aspersions on the possible over-exploitation of the fisheries resources due to the lucrative exports. It was not an isolated phenomenon, for instance, one third of the total fish produced in Travancore during 1921 was exported (Sugeetha, 1994).

(b) It is not to suggest that the technological change was always export driven. Expansion of the domestic market also was enhanced through better processing methods (Kurien,1985).

[19] India has been receiving a substantial aid from several international organizations, including the World Bank, UNDP, DANIDA, NORAD, ODA UK, and Japan. For instance, in 1998, the World Bank granted a loan of US$ 800 million for a National Agricultural Technology Project (NATP), and under this project several projects have started operation under ICAR, Ministry of Agriculture and State Agricultural Universities on the areas of marine fisheries, aquaculture, pearl culture, development of cold-water fisheries, and conservation of germplasm. The Bay of Bengal Programme (BOBP) started in 1979 provided assistance in the development of small-scale fisheries, including enhancing the socio-economical welfare of the fishing communities. ODA UK has provided technical aid for prevention of post-harvest losses in marine fisheries. FAO recently started a scheme for technical assistance in implementing HACCP in seafood processing industries. A Shrimp and Fish Culture Project with World Bank assistance became operation in May 1992 to December 1999 in the states of Andhra Pradesh, Bihar, Orissa, Uttar Pradesh and West Bengal.(FAO, 2001).

mechanism for the optimum sustainable utilisation of the marine resources on the other.[20] FAO's Technical Assistance Programme, the Technical Cooperation Mission of the U.S., and the association with the Government of Norway marked a significant step in the ongoing modernisation in the fisheries sector. FAO had many roles in the fields of fisheries development. Specific projects like designing of crafts, fishing harbours, and auxiliary facilities were done. FAO had also extended its assistance in providing specialists in fleet management, and technical and organisation of marketing facilities. The TCM of the U.S. Government assisted particularly in the modernisation of fishing crafts and gears. It has a great deal of exploratory fishing to its credit in the Indian seas, whereas INP was an area specific integrated programme of fisheries and community development (Panikker, 1958).

Due to the onward drive of fisheries development, certain other aspects like over-exploitation of the resources and other ecological issues cropped up by the end of 1970s. It led the United Nations Convention on Law of Seas in 1982 to set the Maximum Sustainable Yield (MSY) as per the territorial demarcation of the custodial waters- Economic Exclusive

[20] The earlier aspect predominantly determined the operational scope of the market mechanism in the world fisheries, whereas the later efforts of international regulatory mechanisms become effective in the wake of territorial distribution of waters and the over-exhaustion and the imbalances in the marine ecology.

Zone[21]- to every country that has a coast. Further in 1995, the FAO declared the Code of Conduct for Responsible Fisheries to be adopted by the member countries of the U.N. These international attempts stand as the basic directions of policy approach, of late.[22] Both the roles of the international agencies have a clear binding even on the promotion and regulation of technologies.

4.2.4 The development priorities of the government were significant, along with the above factors, in the choice of technology. Modernisation of fisheries was broadly the guiding principle of pre-independence attempts of fisheries development. Though the economic aspects of fisheries development was never underrated, the technological modernisation occurred more as a part of deeper modernisation process the state was undergoing in the various spheres of governance. But with the planned development, the economic priorities, particularly the need for foreign exchange[23], were set into a possibility through modernisation. Throughout the plan documents the underlying economic priorities are manifested in the ever increasing

[21] Rahmatullah Khan(1977) discuss the various aspects regarding the EEZ in the Indian Ocean fisheries.
particularly from the angle of international law. It also widely discuss the various representations and debates in the formulation of the international understanding.

[22] The legal initiatives like The Marine Zones of India Act of 1981 and the Policy initiatives like Fishery Policy, 2002 of GOK have a clear bearing on these international declarations.

[23] The first decade of the Indian planning was mired with an acute shortage of foreign exchange after 1956. The Suez war of 1956 had a 10% increase in the import prices. Bad harvests in 1955-56 resulted in the steep rise in the food imports. The Himalayan war of 1957 increased the defence expenditure drastically (Swamy, 1994).

emphasis on modernisation and thereby the increased production of fish, particularly for the exports. It attempted to accommodate and enhance the small-scale artisanal fish workers into the fold of technological modernisation, by means of economic incentives, training and organisational assistance.[24] Mechanisation and motorisation of crafts, modernisation of gears, establishment and expansion of landing and processing facilities, explorations for the expansion of the resource base etc are the predominant approaches chalked out by the plan documents as the development priorities.

4.2.5 The artisanal fish workers constitute the overwhelming majority associated with fisheries as per population. Set in a collective knowledge pool, their technologies were embedded with their life-world prior to modernisation. The technologies were not necessarily indigenously developed but the 'script' of the artefacts was inscribed to their life-world.[25] Modernisation as a process occurred to them with far wider market, consumption preferences, institutional support, and technological options. Attempting to incorporate the artisanal fish workers to the technological frame of modernisation was an objective set almost from the very beginning of the modernisation efforts.[26] Many

[24] It is to be discussed in the next part.

[25] According to Madalene Akrich (1992) and Bruno Latour (1992), the technological designs embody a 'script' that reflect the social relations, environment, and users.

[26] Schools and co-operative societies exclusively for the fish workers were started under the aegis of the state of Travancore as early as 1917 and 1918 (Sugeetha, 1994)

efforts that include economic incentives through co-operative organisation were initiated by the state for the upliftment of artisanal fish workers. But these failed to live up to the laid objectives (Hakkim, 1980) and fish workers remains to be among the most marginalised among all the social groups in Kerala.[27] But the decades of exposure to modernisation and the socio economic transformations that took place in the immediate society they exist, the fish workers of Kerala have undergone several alterations in the life-world[28], so that they could operate in the modern political sphere.[29] Moreover, it facilitated the promulgation of technological artefacts and designs that are enscripted in the changing socio economic and political

[27] Kerala has a commendable social development record with high male and female literacy, life expectancy, access to health, education etc. But the much acclaimed social progress of Kerala, indicated by the more number of females to males, along with many other factors, is found to be lacking in the case of fishing and scheduled tribes communities (Pushpangadan and Murugan, 1999).

[28](a) The changes occurred in many aspects of life. The transformations taking place in the immediate society they live, with the upswing of mass communication and the increasing identification with the market economy coupled with the transitions occurring in their sphere of economic and political activities, the social organisation undergone a tremendous change along with the mutually constitutive individual preferences.

(b) It is never a uniform transformation economically. Klaussen (1968) and Udayabhanu (1994) notes how the different communities among the fish workers differently fared in the modernization process.

[29] Fish workers 'are the lost people of history'. They were 'silent actors' who were dominated politically and economically always, observes Mc Pherson while writing the history of the Indian Ocean (Mc Pherson, 1993). Even in modern day Kerala, where there were strong political and social movements particularly among the socially less previleged, the fish workers remained out of the political discourse, other than their church-induced participation in the 'liberation struggle'- which is widely held as the upper caste attempt to preserve their hegemony- that held against the first Communist Government in 1959 (Kurien,and Achari, 1988) and their participation in the Punnapra-Vayalar Communist rebellion in 1946 (Udayabhanu, 1994). But the massive political interventions spearheaded by the KSMTF from 1980s (Aerthayil, 2000) mark the assertion of fish workers in the political sphere of Kerala (which invited the wrath of church at many spheres, (ibid.).

environment.[30] On the other hand, these interventions were incorporated into the State's paradigm of modernisation.[31]

4.3 Barring the external agencies, the major three actors who were instrumental in the fisheries development of modern Kerala are the State, the merchant capitalist entrepreneurs, and the artisanal fish workers. They have had distinct technological frames to utilise the marine resources.

4.3.1 As argued above, modernity was the underlying core of the governance, intellectual discourses, and the science and technology development in the beginning of the twentieth century Kerala. Almost all the political, economic, and social institutions operated in the modern rationality. So it was quite a natural process for the State to espouse fisheries development in the framework of rational, scientific, and technological modernisation wherein it has to shed the image of 'primitive', 'ritual' bound 'caste occupation' (Shah, 1948). The modernist understanding of the State did not confine to the design of the fish economy and its obvious linkage to technology, rather it manifested in education, research, and allied areas of socio economic development. Moreover, it also reflected in the way in

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[30] Kurien (1991) and Meynen (1989) discuss the aspects of technological options that initiated from the grassroots.

[31] The plans and programs put forward by the GOK after 1980 are marked with this clear policy change.

which the Indian capitalists articulated the mode of development to further their economic interests and hegemony (Swamy, 1994). Initiated in the inherent predisposition to technological modernisation, the State Policies kept its close pace with the interests of the merchant capital in the following years. The collective interest articulation by the artisanal fish workers and the international and national policy initiatives on the grounds of ecological sustainability mark the policy redirection on the unileniar technological modernisation by the late 1970s. Since then the State policies began to acknowledge the issues pertaining to artisanal fisheries inside the macro understanding of the fisheries development, unlike the earlier trend of imparting the technological modernisation from the above. It is not standing against the criticism of Meynen (1989) who argue that the operational principles of modern technology and its market drastically differ from the 'value system' and 'traditions' the alternatives derive from. But it has to be noted that the semiotic sphere of the discourses on fisheries development has been drastically altered where artisanal fish workers also constructed a space, politically and technologically, since 1980s.[32]

4.3.2 With congenial political and economic atmosphere, the merchant capitalist entrepreneur class, particularly those who

[32] It is not arguing that the political and technological space for a social group is static at any point. It is dynamic and under deconstruction and reconstruction always. It is particularly so with a social group that has multiple disadvantages.

have not been associated with fisheries prior to it, have entered into the fisheries economy in large scale during the mid-twentieth century. Though the role of merchant capital was recorded in the exports from the mid-nineteenth century, its presence in the sector became significant with the increased export orientations of the fish economy.

The technological options of the merchant capitalist entrepreneur class kept abreast with the optimum utilisation of the economic imperatives of the fisheries sector. They kept on adapting and innovating the technological artefacts for economic advantages. The State often guided or supported the technological changes brought in by the merchant capitalist entrepreneur class; both shared the essence of technological modernisation for more production to boost exports. But as the State began to incorporate the international policy directives and the domestic pressures on conservational management, the merchant capitalist entrepreneur class turned against the State policies to keep their economic options intact.[33] By 1980s, the State began to estimate the viability not merely on the economic benefits accrued from the operations, but other ensembles that include ecological sustainability and social accessibility (particularly that of the artisanal fish workers).[34] Nevertheless, the dynamics of technological adoption and innovation that the

[33] It is particularly occurred after the ban on monsoon trawl executed by the GOK in 1989 onwards.
[34] Though the feasibility of such ensembles are rightly criticized by Meynen (1989), the argument attempted here is the widened political and technological space of the artisanal fish workers in the process of fisheries development and its discourse.

merchant capitalist entrepreneur class exhibited is tremendous though that can be obviously attributed to the economic interests they stood for.[35]

4.3.3 Among the artisanal fish workers, historically, only a small section of population could keep abreast with the drastically changing market situation and technological variations associated with modernisation. It does not mean that the overwhelming majority among them kept their market and technology static, but the cumulative changes occurred to their life-world was marginal. The core understanding of the political mobilisation among the artisanal fish workers was their marginalisation as a consequence of the modern technology. As an occupational category, their livelihoods have been affected in the process. It affected adversely to their social organisation due the technological changes and the migrations that followed it. These changes altered their understanding about the ecology and soon they have undergone the depletion of resources. Moreover, the penetration of the capitalist production and marketing system with an immediate access to world economy resulted in the altering of the traditional resource management system. All these intertwined processes together resulted in the political response of

[35] At various stages it is visible. The first prawn export to the U.S. during the 1950s was undertaken by an individual merchant, who made use of the exploratory fishing vessels (Kurien, 1987). Purse-seining was commercially introduced in Kerala, again, with private initiative during 1975-76 (Achari, 1987). Of late, the manner in which the plywood boats popularized by the SIFFS were adopted and innovated by the private initiatives are again one among the many instances of the dynamics that exists among the merchant capitalist entrepreneurs.(Vivekanandan, 2002)

unionisation, ecological response of resource regenerative mechanisms, economic response of common property and income sharing mechanisms and so forth.

Thus, the alternative development initiatives were deeply intertwined to the political strategy and the ideology of the fish workers movement. Broadly, there were two modes of technological interventions evolved as the part of the alternative initiatives from the bellow.

While juxtaposing the 'other', the alternative initiatives resorted to the 'traditional values' of the fisheries 'community' (Meynen, 1989) to support the approaches that enshrine economic and ecological sustainability, and how the 'traditional technologies and traditional knowledge' could be fused with the modern science and technology (Kurien, 1987, 1991). The resource rejuvenation of the common and collective ownership rights were advocated and the technologies that enshrine the values were promoted.[36]

On the other hand, the dynamics of the movement and the volatile market conditions invoked another mode of technologies that enhance the competitiveness of the artisanal fisheries. It aimed to equip the artisanal fish workers to stand on the shrinking spaces, as compared to the mechanised sector.

[36] This mode of technologies is aptly illustrated in the promotion of the artificial reefs- the artificial fish habitats- promoted during the 1980s and 90s wide across Kerala.

Economic feasibility was the prime consideration in the adoption and innovation of these technologies.[37]

The earlier mode of approach tends to overlook the prevailing social and economic conditions by presuming the existence of a pre-capitalist economy and value system. More over, it delimits the question of the redistributive equity, as argued by Meynen (1989), by not considering the demographic pressure, market, political forces, and the prevailing dominant interests of the industry.[38] As far as the later approach is concerned, it could widely be accepted as a survival strategy among the artisanal fish workers. But it inherently involved some policy/ ideological contradictions with the laid understanding of the fish workers movement as the up-scaling of the devices to competitively viable implements have also added to the resources depletion and thereby affected the ecological and economic sustainability.

Despite these, the State has recognised both the streams of technological interventions and the policies since mid 80s and mark the broader incorporation of these into the programme of fisheries development in Kerala.

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[37] Adoption of the Nylon gear and motorization of the country crafts were the two major steps towards this direction.

[38] The random responses from the fields as the part of this study corroborate this stand. In the case of artificial reefs, for instance, many operational problems are encountered in the rights over the catch and distribution, exclusion and inclusion of certain individuals or groups in its micro context.

4.4 The process of fisheries development involved the above actors, attempted to address the issue of technology in various aspects. Often the questions on technology were pertinent and found a reductionist symbolic political value by devoiding them of the deep-seated social, economic, and political options exercised in the choice of technology. Broader discussions were held on the indigenous and exogenous technologies, modern and traditional technologies, technological diversities and homogenisation, adoption, rejection and control of technology, and technological alternatives. Most of these terms were defined relatively, and often the themes overlapped.

Chapter 5

Conclusion

One of the most striking characteristics of the modern life is the role of technology that is encapsulated in all the walks of life. It is so much so that the technological development is depicted to be an autonomous process with its inner technical logic. But of late, these technological deterministic views are contested on the grounds that the technology is understood to be a social process wherein social, economic and political factors shape the technology.

Being a 'socially contingent' process, the differential access over the technological 'design' and the subsequent technological process may result in the hegemony of a social group or a set of groups over the disadvantaged others. This is particularly relevant in the third world at present, due to the issues evolving as the part of globalisation and techno capitalism. So it is pertinent to inquire into the technological process in general.

The fisheries development in general imbibe many aspects of the technological process, not only as an area that make use of a range of artefacts from mere devices to Computer-Aided Design and Global Positioning System, but also as a widely

dispersed social activity that employ some forms of the technological artefacts or other at every point of its exercise. In the organisational and economic forms, fisheries encompass a wide range from small-scale fisheries to industrial capitalism. The selection of Kerala fisheries particularly engage in the political peculiarities of the process, not only from the part of the State but also in setting the political and technological alternatives too.

Most of the studies so far hold the opinion that the fisheries development in Kerala has its particular upsurge with the mechanisation process that is associated with the commencement of the Indo Norwegian Project in 1953. It is mostly argued across the academic and activist spheres that the rapid modernisation that took place during 1960s and 1970s, and the subsequent consequences like the resource depletion and marginalisation of the artisanal fish workers are the result of the mechanisation process.

The policy initiatives that the State has put forward throughout its operational spheres tend to suggest that the institutional mechanisms which have aimed to incorporate the fish workers have not kept abreast with proclaimed aims though it has been carried out for decades.[1] It is with the synoptic

[1] The efforts for modernization among the fish workers were held widely from the first score years of this decade in the form of special schools, training programmes and cooperative organization, across the times. But it took till the 1980's for them to exert an organized attempt to interfere in the discourse of technology, outside their realm of operation.

changes that occurred in the sector for the last score years, particularly due to the initiatives from their fold, that the technological and social security measures began to fare better. The State policies remain aloof from the actors who are involved in the processes tend to suggest the systemic lacunae of administering the affairs.

This exploratory study tends to suggest that the fisheries development that took place in Kerala from the beginning of the twentieth century reflect the deeper political, economic and social discourses that are prevalent in the time. It kept abreast with the ideology of modernisation- the dominant discourse of the social actors who have wielded the ideology of the State. The dominant social and economic forces could enter into the fisheries sector with their own 'technological frames' for the furtherance of their interests. The fish workers, an overwhelming majority who have been marginalised in the process, were exposed to the 'decontextualising process' of modern technology from their pre-modern techniques that were 'contextually entangled in the life world', could intervene in the political discourse of technology by 1980s. The politics of technology is attempted in two ways as far as the fish workers are concerned. The foremost was by challenging the dominant patterns of technology. In a textual reading, it attempted to 'rewrite the text'. In the process of attempting to rewrite the text, the discourses on tradition as

against the modern, the indigenous -exogenous, heterogeneity - homogeneity (of technologies) etc have evolved.

The traditional technology that is put forward by the fish workers were not the reconstruction of the past technology but a technological possibility of the present wherein one attribute the presumed elements of the past into the exercise of a present technological option. Thus, the movement used tradition as a set of political possibilities to approach the present, often as a construct that fulfil the political requirements of the present by the process of selecting a presumably constructed past.

The other attempt to address technology was by challenging the 'symbolic discourses around the technology' by introducing the 'alternative readings' of the dominant technology. In other words, it is to argue that the politics enscripted in the sartefacts can be appropriated through the political and technological interventions by a section of actors who have not designed the artefacts.

Thus, this exploratory study throws light to the 'mutually constitutive' role of society and technology wherein the deeper socio esconomic and political forces play a determinant role in the process of technological choice at one level, and technologies thereby facilitate a redefinition in the social relations. That is to imply that the technologies are set in the 'discursive field' from

where it ascribe the 'multivalent' characteristics. Hence, as any other social activity, it may embody a different set of values for different set of social groups, that may differentially equip their 'technological frames', to be compatible with 'dominant discourses' in the discursive field. If the dominant discourses are to be altered, it may alter the technology itself or it may introduce alternative reality of the existing technologies. And hence, the possibilities of the technology are, in fact, the possibilities of the politics itself.

Appendix - I

	Artisanal	Modern	Ultra-modern
Production	Small scale	Massive	Manifolds of modern
Capital	Less capital intensive	Capital intensive	Heavily capital intensive
Consumption	Predominantly local	Predominantly trans national	Fully trans national
Ownership	Individual/group	Corporate/merchant capitalist.	Transnational/corporate
Energy used	Human/wind	Fossil fuels	Fossil fuels
Actor's orientation	Traditional predisposition-largely sustenance.	Merchant-capitalist profit motive. Upscaling traditional predisposition.	Corporate business-profit motive
Development phases	From time immemorial	Beginning of twentieth century	By the end of 1970s
Current status	In a decline, adopting new technologies-motorisation, less income levels, affected of the consumption changes.	Incorporating motorization from the artisanal sector, adopting new communication and safety technologies, increasing demand due to the consumption changes, challenges from the ultra modern sector.	Higher capital inflow. Intense technological upgradation, introduction of factory ships with voluminous capacities, global consumption, preference for the species that have higher market demand.

Matrix of Inventories -1

Mechanised	Non-mechanised	Motorized
Trawlers	Plank-built boats	Ring seine
Gill netters	Dugout canoes	Plank built boats
Dol netters	Catamarans	Dugout canoes
Purse-seiners		Catamarans
		Plywood boats

Matrix of Inventories -2

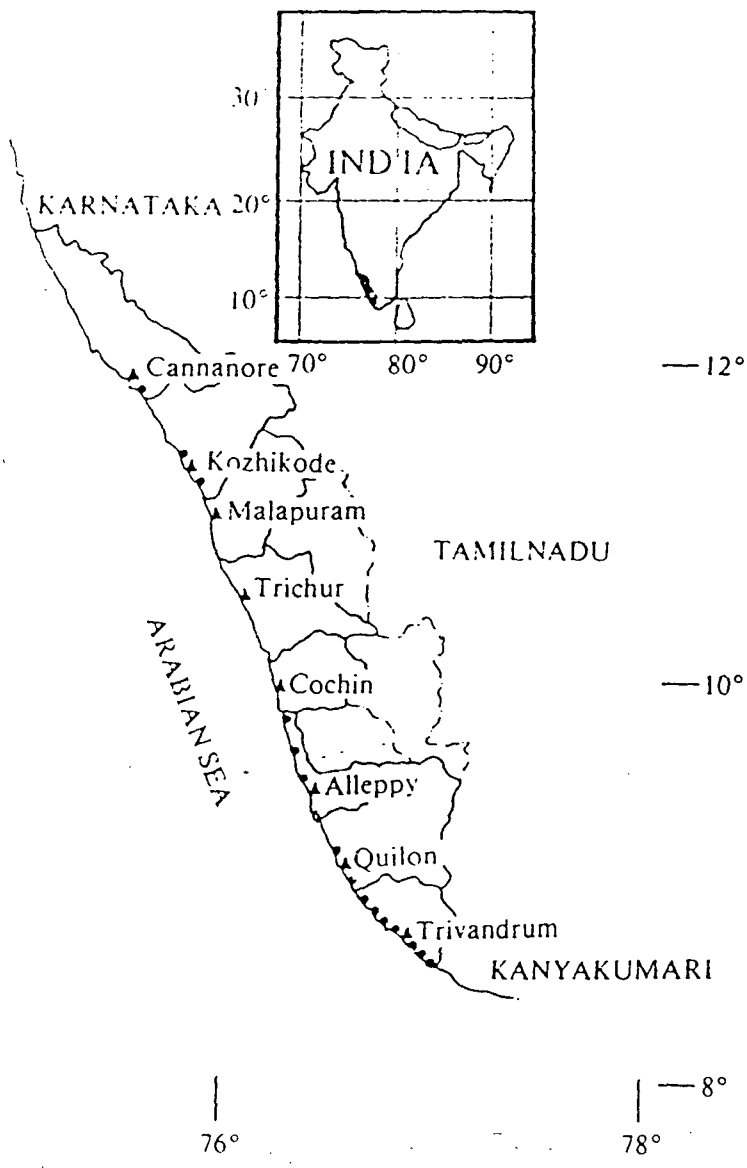
Appendix --II

Year	India	Kerala
1950	5,93,750	-
1955	5,.96,000	-
1960	8,80,250	-
1965	8,33,750	3,46.600
1970	10,86,750	3,92.000
1975	14,23,750	4,20.000
1980	12,50,250	2,79.500
1985	15,35,500	3,26.000
1990	22,18,750	6,62.900
1995	22,25,024	5,32.000
2000	27,18,750	5,98.000

Total marine fish landings --India and Kerala in tonnes.
(Sources: Kerala government, CMFRI, and Economic Survey documents of various years.)

Appendix-III

Kerala



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