

The Scientific Worker and the Field

Seeing Value in Fisheries Science

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Drawing attention to scientific work as labour, the need for a closer examination of the subjectivities of educated, trained government employees in charge of field data collection on marine fisheries is emphasised. Field sciences such as fisheries science offer an opportunity to examine how workers engage with the field to produce value. Tracing historical influences that contribute to dissimilar identities and experiences with the field among scientific workers in India today reveals how value in routinised forms of field-based scientific labour is better understood through embodied skills and cultural relations forged by fieldworkers.

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Convincing people higher up for [us to do] this stock assessment was always a problem for CMFRI ... The top person will be mostly from agricultural science and he has to be made to understand what exactly is stock assessment, why this is necessary. To my mind, there is always a question—why you are keeping on doing it for the last [...] for the last few decades! ... what is it that you are doing? What is the value of that? What is the conclusion, how it is helpful for anyone, fishermen, or whoever it is?—a retired CMFRI scientist. (Interview conducted on 4 January 2018)

State investment in institutionalised science cyclically poses existential challenges before government scientific organisations such as the Central Marine Fisheries Research Institute (CMFRI). Explaining how their scientific labour creates value, why the scientific worker is an exemplary category of government employee and how the organisation's expertise is irreplaceable, persist as continuing trials for CMFRI's leaders since its formation.¹ The production of value through scientific labour on marine fisheries as generated by those at lower rungs of hierarchy of this scientific organisation is the focus of this article. The critical lens on labour relations in nature is often trained on the practices of resource-dependent humans such as agricultural peasants, fishers and forest dwellers with few exceptions examining other forms of labour in nature such as scientific work.² This article draws inspiration from studies of field sciences (Kuklick and Kohler 1996) to understand the contextualised practices in which value in the field sciences such as fisheries science is produced by a class of scientific workers.³ The rise of fisheries genetics and a range of laboratory-based, mathematical and statistical computing research no longer requires successful scientists to be directly dependent on the field to demonstrate their expertise.⁴ Despite this, some CMFRI scientists, particularly from the older divisions of the CMFRI, still engage in short and long-term field-based scientific practices and produce narratives that privilege and value fieldwork. However, the forms of engagement with the field vary among scientific workers. In this article, I focus on the subjectivities of lower grade technical staff of the CMFRI whose primary responsibility is to visit the field and collect fisheries data, a crucial step in the making of catch statistics and fish stock assessments.

Alfred Sohn-Rethel argued in 1978 that labour is hardly ever only intellectual or only manual.⁵ Measuring the value of scientific labour for the state has always been a knotty affair particularly when it does not translate into tangible measurable outputs such as resource productivity. Unlike agricultural science, where India has seen a longer period of attempts at

fixing productivity metrics albeit with limited success (Rajeswari 1995), correlating investment in science with total fish caught or produced is far more dubious given that biological work in fisheries is more diverse than just the culture of fish. Since the CMFRI came under the centralised Indian Council of Agriculture Research (ICAR) in 1967,⁶ some of its more outspoken leaders have attempted to negotiate autonomy from the yoke of ICAR's agricultural paradigm for the marine sciences. Two retired directors I interviewed between 2014 and 2017 spoke of their having to repeatedly convince officials of a strongly hinterland focused, terrestrial, production-oriented Ministry of Agriculture, on the need for continued funding of specialised activities such as the collection of long-term biological data on commercial marine species and on the calculation of fishing effort and catch across more than 6,000 kilometres of Indian coastline. Arguing for a separate Fishery Data Centre in 1970, the lead statistician for the CMFRI, S K Banerji (1970: 93) plainly stated that "the concealed nature of marine resources made its estimation more important than agricultural resources and that the collection of such 'resource statistics' was a 'specialist job'." The specialist was primarily the one who passed through education and training infrastructures and academic disciplines gradually built over the 20th century in India.⁷ This served to separate the knowledge of those who worked in fisheries (fishers, traders, etc) from those who worked on fisheries (primarily scientific workers), creating different streams of expertise on marine nature. This specialist was also a government employee obligated to perform their duties unlike the fisher, who possessed the same information but was under no obligation to part with it voluntarily or otherwise.

Aside from the directors and principal scientists, down its hierarchy, the CMFRI's staff have regularly attempted to negotiate the value of their labour within the science bureaucracy, making an argument for professional distinction that combined embodied expertise as well as field-based ethics, the innovations, sensitivities, traits and practices that make for "good" scientific workers. It is at the lower end of this hierarchy that we find an alternative image of science and what constitutes value in fisheries science practices, produced in its workers' experiences of getting to, studying and staying in "the field." Paying attention to this form of work provides a fuller account of what goes into making quality in data and in field sciences across varying geographies and natures.

Hierarchies of Data Gatherers

Fish stock assessment, a combination of biological and statistical work, has become the mainstay of institutionalised fisheries science across the world and is neither a simple nor an inexpensive affair. It combines biology with statistics and requires reliable data on important life stages of fish (for example, growth, reproduction, recruitment and mortality), drawn from an extensive biological sampling programme, and on data on fish landings or catch.⁸ Despite the scientific criticisms and limitations of stock assessments as objective and putative rational measures of the abundance of marine life (Brooke

1981; Finley 2011; Telesca 2017), none of the maritime fish producing nations have been able to jettison these methods altogether in the absence of better means of measuring marine fish resources as eventual fungible goods. Soon after independence, when the Central Marine Fisheries Research Station (CMFRS) was set up in Mandapam,⁹ in 1948, a sampling method and pilot survey for collecting catch data from the extensive and diverse Indian coast was trialled in 1949 by statisticians S K Banerji and D V Bal (Srinath et al 2005; Bal and Banerji 1951). At this time, catch data was collected for the whole country by dividing it into 12 zones each with two to three centres sampled per zone. These sampled centres were the beat of 12 trained graduates designated as "survey assistants" overseen by the expert statisticians. The sampling coverage was increased to 20 zones in 1958, adding many more centres across India's diverse coastal landscape. The methodology used to estimate marine fish catch is the Multi-Stage Random Sampling Survey (MSRSS) recognised by the Food and Agriculture Organization (FAO) of the United Nations.

Divisions of Labour

Prior to 1975, the lowest rung of workers of CMFRI's hierarchy were lab-cum-field assistants (LFA), who were BSc graduates (often in zoology). The next levels of workers were junior scientific assistants (JSAs) (BSc graduates), research assistants (RAs) (MSc and above) and senior research assistants. Mobility was possible across this simple hierarchy as long as educational qualifications were met. While everyone went to the field, it was only research assistants who undertook analytical work in addition to fieldwork.¹⁰

From the early 20th century, only BSc graduates were recruited to the fisheries departments, the Zoological Society of India and later the CMFRS, CMFRI's predecessor. In the early decades of CMFRI, freshly recruited assistants were sent by the directors to carry out "survey work" (collect catch data), biological sampling and based on their qualifications undertake studies and supervise other staff. The work itself was not highly compartmentalised, and everyone across the hierarchy was expected to spend a great deal of time outdoors, in the field, to make collections and observations on beaches, intertidal areas, snorkelling, swimming, going out to sea on local fishing boats, sorting and storing their data and samples. Survey assistants could shift into the role of researchers, based on acquiring an MSc degree, and based on their aptitude as discerned by their seniors. In this hierarchy, it was the survey assistant (LFA) who had a peculiar set of interactions with the outdoors. In addition to identifying fish and recording their numbers according to a sampling protocol, he was also required to interact with fishers and faced the additional challenge of having to defend to them his practice of data collection, more than other field assistants since he did not pay for the data to be collected.¹¹ In contrast, biological samples (fish of various sizes) were obtained by paying money for the samples, as any customer in a fish market.

In 1975, the Agricultural Scientists' Recruitment Board (ASRB) was set up and in 1978 the Agricultural Research Service (ARS)

was introduced (Randhawa 1979: x). A new hierarchy accompanied the new structure, dividing workers at the CMFRI into “Scientists,” “Technical” and “Administrative” staff. Each category of scientific worker came with its own series of promotion grades and pay scales.¹² Those who were recruited as field staff at this time, saw this move as having introduced tremendous rigidity for upward mobility of labour from the technical to the scientist categories. Under the new ARS scheme, individuals were automatically inducted into the scientist category if they had an MSc degree awarded prior to 1 October 1975. However, some RAs and JSAs who had only BSc degrees were also inducted into the scientist cadre leading to prolonged objections and petitioning by a section of technical staff. The LSA category of survey assistants were automatically placed in the category of technical staff. They could enter the scientist category only if they passed the ARS exam which over the years attracted more fisheries science graduates than zoology graduates.¹³ Fresh recruits for undertaking catch data and biological samples were admitted in technical category T1. Gradually, the number of technical staff increased to around 120 to cover the large Indian coastline as changes in sampling procedures and coverage improved, but mobility between research work and survey data work was and continues to be restricted as greater centralisation and bureaucratisation set in.¹⁴

Data Collection

The evaluative appeal of fish stock assessments since the post-war years necessitates specialised fisheries data collection (Finley 2011). Understood as the predictive method of estimating how much fish can be taken out sustainably from a fishery, fish stock assessment is now the backbone of marine fisheries science work across the world. In India as well, it requires the organising and oversight of several specialist workers not just at the computer and in labs, but foremost, in the field to collect statistical and biological data.

Statistical data on fish catch was valuable for the new nation as an indicator of its potential wealth, but also its state of productivity (Bal and Banerji 1951: 1). Even after the first pilot surveys undertaken in only a few locations across the country with minimal survey staff, Bal and Banerji (1951) noted innumerable difficulties in the field which posed challenges to this kind of work. Chief among these was the lack of cooperation from the fishers. The authors note that survey assistants faced multiple challenges in addition to transportation problems (“The assistant may have to wade through mud, sand and paddy fields to reach a fishing village”) (Bal and Banerji 1951). They worked under financial constraints (12 survey assistants were recruited to collect statistics for 250 miles on an average) and difficult conditions of the work (getting leave was difficult; there was no guarantee of food or shelter in the remote villages of coastal India).

By [the assistants] moving among them [fishers] constantly and by explaining to them the motives of the survey, the assistants have won their [fishers’] confidence to some extent. Even now they have to face intense opposition in some places. This attitude [of not sharing information] of the fishers arises from their fear that their century-old right

to exploit the sea may be curbed by the imposition of taxes and that the survey assistants are secretly assessing their capacities for paying such a tax. (Bal and Banerji 1951: 3)

The nature of conditions of work (remoteness, lack of proper facilities for food and water, and “uncooperative fishers”) persists even in present-day accounts of “fieldwork” by survey staff. Collections of catch data and biological samples are made from the coastal shore, at some of the busiest times in the fishing day and are collected from several landing centres distributed unevenly across 20 zones (Srinath et al 2005). Each landing site is a blur of activity, almost chaotic to those unfamiliar with its patterns. Boats return from fishing often early in the mornings,¹⁵ and in swift succession fishworkers unload fish roughly sorted in bags or baskets. Numerous quick auctions are conducted in tight clusters of fishers and traders with little room or patience for non-participants; the fish moves hands rapidly and vanishes quickly into packing sheds and godowns awaiting distant destinations. Tempers in these sites are high, as people move fast to unload, pack and send away a highly perishable and valuable item. Idle spectators are not appreciated, especially if they bring no monetary benefit; they risk being seen as harbingers of bad luck and poor catches by quick-tempered fishers. Fuelled by the tension in the air, bold and colourful abuses are directed at an inquisitive onlooker or those without a legitimate purpose or relation to the space or its occupants. This exceptionally sensorial coastal space is the “field,” the main working environment of the survey staff of the CMFRI.

Over the last few decades, catch statistics of the Fisheries Resource Assessment Division (FRAD) and stock assessments have featured prominently in the annual reports of the institute. Given the history, scale and method of CMFRI’s field-data operations,¹⁶ the coordinated statistical estimation of catch data and biological sampling from landing sites of India is not easily replicable by any other organisation at present.¹⁷ There is no equivalent of coordinated, field-based resource statistics collection by a single agriculture organisation of the ICAR for all agricultural products in India. The peculiar practice of the CMFRI sending trained workers into the field to estimate catch by undertaking direct field-based observations and data collection across the whole country, when the state fisheries departments also do their own fisheries catch and trade data collection, has been a difficult issue noted by the Ministry of Statistics and Programme Implementation (CSO 2011: 15). The CMFRI has regularly bolstered their claims to expertise with a reference to the superiority of the sampling method and the training and expertise of the employees in collecting both the biological and catch data.¹⁸

Field Expertise

The introduction of professional scientific instruction in zoology actively passed on its normative underpinnings developed in 19th century Europe to its students in British India. Chief among these was the ethic of hard work in the outdoors, with a motivation chiefly towards reaping non-pecuniary rewards and the performance of a function that entailed a social purpose (Haskell 1984: 188). The importance of field expeditions

and surveys to the field of ichthyology, was stressed by early educators and leaders of the Zoological Society of India and British India's first zoology departments.¹⁹ Leaders and legends in early fisheries studies undertook extensive field surveys,²⁰ data collection and publications that immortalised their efforts and the unseen labour of their assistants from the colonial period onwards.

Field operations also served to signify state power in being able to command and coordinate the presence and work of personnel in far corners of state territory. Perhaps the most revered achievements in accounts about the early directors of the CMFRI, were their affinity for the field. Hot, humid and remote Mandapam, straddling the Palk Bay and the Gulf of Mannar, with its spectacular marine diversity, coral reefs, seagrasses and clear waters, was an ideal space for new leaders of the CMFRS to demonstrate what exertions the field-based study of fisheries entailed. Dedication and leadership was recognised and enforced by early directors and scientists through setting an example of their own physical exertions in the field, personal discipline and self-control.²¹ Santhapan Jones²² required all researchers and younger staff at Mandapam to accompany him at sunrise to inspect the beach to conduct collections and make observations, driving and walking to various parts of the coast, wading in the shallows, snorkelling, physically handling dead and smelly marine species, making dissections of animals, removing its flesh, gut and body parts themselves, and later recording, analysing, writing and publishing (James and James 2009).

In accounts of initial experiences in the field, one understands how new technical staff recruited into the CMFRI come to recognise markers of such embodied expertise, time spent in the field, the knowledge of fish, boats, fishing operations and relations with local people working in fisheries. It allows the technical worker to distinguish himself in the organisation as its metaphorical ears on the ground. In the absence of simpler prospects of promotions to the rank of scientists, technical staff could only distinguish themselves by exemplary performance of innovative and quality fieldwork.

Approaching the Field

As part of my ongoing doctoral research project which produces a historicised account of fisheries science in India,²³ I conducted detailed purposive interviews between 2014 and 2018 with scientific and technical staff (on duty and retired) who were placed on survey work. From these interviews and from published records, I was able to reconstruct the nature of survey work and the mixed reactions it evoked. Almost all are driven by the prospect of employment, and the people I interviewed stated that some recruits agreed to fieldwork for the opportunity to see parts of the country they could not afford to visit. They reported that when the actual work begins, some are unable to come to terms with the amount of solitary travel, lack of standardised amenities across zones, the repetitiveness of the work, the physical exertions and the uncertain engagement with fishers. A retired survey staff with several years of experience stated that it was often difficult for a single staff member to handle the field situation.

I don't think only one man should go, there should be two staff members. It would help him deal with the loneliness of that work. I think it would help him in his involvement there. You see, when you are facing a crowd all alone, there will be some support, isn't it? Now I think it is like that. I was not of that nature, but there are some difficulties in work that is solo and brings about loneliness ... the fishermen crowd, their mood is different. They will always be worried that they don't get fish. They are fighting with nature. Now to go and ask them all these things, they will find it inconvenient won't they? So, there are these kinds of hardships. So when you compare with the survey staff and the staff who is working for fish sample collections, survey staff is at a loss. It is very pathetic. (Interview, 10 February 2018)

To overcome this, survey staff builds relations with fishers in multiple personalised ways. Some offer money and small gifts to fishers and traders, bringing a newspaper to share, giving news from other parts of the country and offering tea and snacks.

I used to do this *dhaana-dharma* [dutiful giving] because that is what they also appreciated. Instead of keeping on asking "what fish did you get" because that just frustrates them [fishers]! If the same survey staff keeps on going to one place, I think the fishers stops being cooperative after some time, this is what I feel. It is best to keep changing the man I think. It's not like the way you would imagine that if you had the same man there, you would get good data. (Interview, 10 February 2018)

One technical officer, a high caste Brahmin, was a well-known astrologer and was sought eagerly by fishers to assist with predictions in their personal affairs. I was told by my interviewee that he was one of the few Brahmins in this job, and more surprisingly, one of the few men who actually enjoyed his work and had no problems with fishers. The perks of the



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job, aside from the travel and daily allowance,²⁴ were the relative freedom and autonomy of a person being alone in the field despite its physical hardships.

For remote landing centres, survey assistants sometimes had to travel a day in advance and spend the night in the bus with the conductor and driver, collect the data in the morning and repeat his overnight stay in the bus on the way back. Staff have sometimes stayed in godowns and sheds sharing the space with malodorous fish packing material. Scientists too have endured such trials on their fieldwork. The story of how former director P S B R James followed ribbon fish migrations across multiple coastal states, catching a series of mofussil buses, walking long hours under the hot south Indian sun, sleeping overnight in fishing sheds, eating rice gruel and fish and repeating this across various sites, is recounted by many as an example of dedication and rewards from fieldwork. It was acknowledged by one scientist that survey work could lead to boredom, unless you did it for a short period, changed places or knew that it was not your “real work.” This possibility to mix it up is somewhat limited for survey staff, who might change locations but whose overall nature of work remains relatively unchanged over the course of their working lives, unless they are promoted or shifted to other tasks. Many technical staff of the FRAD have spent virtually all their working lives doing survey work, occasionally assisting in making collections of biological samples and on rare occasions being given joint authorship in publications which constitute better, although limited, opportunities for self as well as status improvement.

The field is not terra incognita, and workers (both scientific and technical) arrive here with certain ideas of what it means to “toil in the sun.”²⁵ Some survey staff consider their work to be of an inferior nature preferring instead the commonly respected standards symbolised by regular attendance in an office, staying within the confines of an “air-conditioned room” and a desk job. Self-referencing statements of their low status include, “roaming like a dog,” “wandering like a madman in the sun.” At the same time, those who rushed to procure for themselves office comforts are ridiculed as not being wholly committed or strong-willed enough to endure the trials of the field. Some scientists also decry the avoidance of fieldwork among their ilk, but unlike the technical staff on survey work, as a category of workers, scientists have diverse avenues to display expertise and accrue higher status should the field prove too punishing.

Duty in the Field

Given that technical staff are allotted certain areas as their beat, once they reach their centres, and begin visiting the field, they have to ensure that they create conditions to enable them to stay there over longer durations, doing the same set of tasks of recording catch, and making observations on fisheries and sending these to the centre on time. The difficulty in achieving full surveillance of the quality of survey work is acknowledged as a limitation by heads of the FRAD division.²⁶ Survey work itself is not easy for the most conscientious of workers. Even

those attempting to meet even minimum standards of proper survey work need to go beyond scientific data collection protocols to develop a contextual set of methods, skills and sensitivities, reminiscent of anthropologists in the field (Schumaker 1996). Rajesh [name changed] came to the CMFRI through a series of encounters with poverty, struggle for employment and education, but gradually overcame these challenges and even got an msc degree, although he remained in the technical category till his retirement. One of his earliest jobs during his youth was as an “accounts boy” to a trawler owner in the Madras harbour. His familiarity with fish landing centres and with fishers allowed him to speak to fishers “in their language” during survey work. His long years of service in fisheries equipped him with unique skills compared to his peers of moving around the harbour in peak hours of business. In addition, he explained how being in the field over longer durations was a necessary condition of staying familiar with fish; to generate quality in data.

When I used to go to the landing centre, it was really easy for me to immediately identify each fish, tak, tak, tak. They all used to be surprised at my knowledge of these fish. You know the thing about this field is every field observation ... each opportunity you have, you should constantly keep looking at fish ... only then will you be able to immediately say “this is this fish.” (Interview, 17 January 2018)

Even an experienced person like Rajesh, with his multiple contacts, friendships and connections in the landing centre, often has to explain to fishers why he collected this data. He offers his strategy, a sensibility that expresses the delicate position of the government fieldworker, mediating the space between the state and its citizens. Promoting an extreme humility in interactions with fishers he cautioned against throwing one’s weight around like a “government officer.” Another colleague had once paid the price:

He had a really rough method of “handling” ... then he went to [name withheld] hamlet and acted big. Showed off saying that he was working in the government and showed like he was a big officer ... They nearly beat him up when he came to collect data. Big trouble happened, he came running to this office and said I cannot collect data, saying there is this centre where they came to beat me up! ... The thing is, his behavior was not good. Instead of acknowledging that they are suffering and that they are not getting any proper fish, he just went there and acted like a government officer, “you have to tell me what you got.” ... (Interview, 18 January 2018)

Arguing for humility in approaching fishers, he states,

I’ll tell you one thing, if you accept a fact [fishermen’s statements to them] as if it’s just been slapped on your face ... then the other person will never get angry with you. All the ways in which a person can get angry with you will lessen. (Interview, 17 January 2018)

Rajesh gave many instances when the fisher was constantly worried about his catch, and often accused data collectors of being responsible for low catch rates by bringing bad luck, enquiring about the catch itself. He presented an incisive way of approaching the field in science which serves well as a personal ethic to surviving in the field.

It is only because the fisher goes out fishing, toils in the sun and brings home the fish, that we are able to collect this data. If not for them, where would we be? (Interview, 17 January 2018)

In a similar way, he accorded fish also the same reverence; he thanked it for giving him his job, education, his house and pension. While these might appear as rhetorical statements that protect the data collector from personal harm during duty, it also serves as a reminder that the whole edifice of fisheries and fisheries science in India emerged on the promises of social purpose, a responsibility towards improving and sustaining food, fisher and in India, the overall alleviation of suffering from hunger (Prasad 1944). To this scientific worker, if the act of collecting scientific data itself causes further suffering, then the technical staff must have the grace, sensitivity, ethical and common sense to at least not exacerbate the frustrations of diminishing catch by asking and recording it openly. Given the non-monetary extractive nature of this data collection, some survey staff consider it important to “give back” in a manner that is emotionally acknowledged by fishers than rationally understood. These qualities of patience, empathy and non-obtrusiveness, along with the ability to negotiate physical exertion and verbal abuse are embodied skills that cement virtue with expertise. Without this form of expertise, reliable data from the field cannot be generated irrespective of surveillance and inspections.

Conclusions

Given the “applied” nature of fisheries science, as an actively policy-directing endeavour in many maritime fishing nations, there is no turning away from assessing the health of fish stocks and collecting data on the trends in fish and fisheries. As long as there is state interest in the scientific estimation of fish resources in its territories, organisational expertise and quality in fisheries science will continue to depend on how the scientific worker spends time observing and studying the field. We have seen how fieldwork is more than just the performance or non-performance of scientific protocol and duty.

Its historical disciplinary antecedents have rendered labour in the field sciences evocative of physical hardship and virtue. But, for continued interest in such non-pecuniary actions to persist, labour in the field must go hand-in-hand with reward and recognition that represents higher social status. For the scientist, fieldwork offers the possibility (although not certainty) for building reputation as a good scientist, producing empirically oriented publications and eventually promotion and prestige. However, for the technical staff, fieldwork is primarily a job requirement that entails long years of routine work, and promotions and pay upgrades within the technical category, a limited upward mobility of social status. In the absence of wider reputational rewards and upward professional and social mobility, the field is reduced to a narrow arena for survey assistants to display expertise through professional virtue and relational integrity, values with an uncertain future.

Paying attention to the scientific worker and his engagement with the field illustrates the role that context plays in making “Indian fisheries science.” A close investigation of the scientific worker’s entry and presence in the field presents alternative accounts of good or bad quality in fisheries work against the conditions and relations of its production in the field. Any attempts to valorise expertise in CMFRI’s science must acknowledge how scientific fisheries data gets produced, through the necessary translation of scientific protocols into contextual practices of cultural relations and embodied expertise arising from the far corners of the Indian fisheries field.

Seeing scientific practices as forms of labour and taking “the field” as a constructed rendition of “nature,” the arguments presented above contribute to scholarship that theorises the relations between nature and labour in the production of value. In this account the successful production of value by workers engaged in field-data collection is shaped not just by an adherence to scientific protocols, but by the subjectivities of workers, an overlooked aspect in discourses of expertise and its rewards.

NOTES

- 1 Within spaces of organised scientific work (teaching and research) such as universities, research institutes and associations, leaders are not only those occupying top official positions such as directors or those at the top of their work as scientists, but also those with a reputation for “organising.” This entails taking decisions and inducing actions that enable the growth of these bodies and secure the interests of its employees as a collective.
- 2 See Vasan (2002) for an ethnography of the forest guard and relational work.
- 3 Across history, sociology and anthropology, a turn towards context and practice has provided richer explanations for human action rather than abstract and decontextualised ideals in science.
- 4 Success here denotes being well-published, given that it is an important criterion in promotions within the ICAR system, but also beyond.
- 5 Some forms of work fall more in one domain than the other. Within certain “field sciences” such as fisheries science, a large amount of this labour involves manual exertions under varying field conditions. This form of labour organised under the rubric of the discipline of fisheries science and through the structure of the state agricultural research bureaucracy, is tangibly compensated for in the form of wages but also by badges of distinction through promotional pay-grades and designations.
- 6 The Imperial Council for Agricultural Research was set up in 1929 and renamed Indian Council of Agricultural Research in 1946. It is at present an autonomous body connected with the Ministry of Agriculture and Farmer’s Welfare.
- 7 Initially, this was mainly zoology, with a specialisation in marine biology and fisheries.
- 8 Resource-poor countries like India use catch data for stock assessments, whereas European nations and the United States obtain their data by sampling directly from the seas on-board vessels. Although more reliable, the latter is not only expensive, but also calls for seaworthiness among scientific workers.
- 9 The CMFRI was first set up in Madras, but shifted to Mandapam and began with a small centre called the Central Marine Fisheries Research Station at Mandapam by the Gulf of Mannar.
- 10 Research assistants were zoology postgraduates from established colleges under the tutelage of reputed professors.
- 11 All survey staff in CMFRI are men.
- 12 Scientists were recruited after the ARS exam at S1 grade, moving from S1 to up to S8 (the post of the director and principal scientists). Technical staff were recruited at T1 grade and can move up to T8. Administrative staff followed other protocols as per Government of India administrative rules.
- 13 Masters’ in Fisheries Science (MFSc) degrees were offered by the Central Institute of Fisheries Education in 1989. By the 1990s a large number of colleges of fisheries and fisheries universities began offering such degrees.
- 14 More recently, scientists have begun to add the names of technical staff on certain publications. This does not of course provide the same prestige associated with the designation “Scientist,” however lower the grade.
- 15 This depends on the target catch, the season, on the kinds of boats (trawlers, gill-netters) and varies across landing centres in coastal India. There are centres where night fishing takes place and these are incorporated in the sampling methodology.
- 16 Included in these operations are innumerable hours of local, regional, national and international training, specificity of the multistage stratified random sampling methodology, the coordination of human resources for regular data collection, enumeration, verification, supervision across various states and the storage of prior data and the financial investment in the infrastructure over decades.

- 17 Each of the maritime state governments have also historically collected fish landings data since the time the Bureaus of Fisheries were created across the provinces. However, the rigour of their methods, expertise of their personnel and computation methods in comparison to that of the CMFRI have always been a point of contention. Banerji (1970) had argued earlier that CMFRI alone had the capability for “intelligently analyzing” resource statistics for the whole country, and should house a centralised Fishery Data Centre for all forms of fisheries-related statistics—both trade and resource related.
- 18 Notwithstanding revisions, improvements and innovations of method and analysis within the specialised work of stock assessments, few fisheries scientists would argue that nations can now stop collecting catch data or biological information on commercially important species.
- 19 As director of the ZSI, after Nelson Annandale, R B Seymour Sewell promoted the practice of college and university students accompanying the ZSI’s surveys and expeditions as an important form of training and mentoring in various facets of doing science in the field.
- 20 Francis Day’s tome *Fishes of India* alternates as bible and benchmark within the CMFRI. “There can only be one Francis Day” I was told by a former director of CMFRI. Indeed, Day had the support of a vast network of government staff and departmental officials to assist him, at a time when Imperial Power ensured that people parted with data easier than with present-day investigators of fisheries. Day’s Empire wide access to places and people, and financial support, authority and autonomy was recalled by scientists as the ideal conditions for science, unthinkable in present day institutionalised science.
- 21 The early directors were described by interviewed scientists as even being “task-masters,” but

- these qualities were forgiven when they were seen as successful in terms of their knowledge.
- 22 Santhapan Jones was director, CMFRI from 1957 to 1970, the longest tenure among directors till date.
- 23 My doctoral research is an ongoing historical study of institutionalised state-funded fisheries science in India. I examine practices related to assessments of marine life, ranging between the mid-19th century to the present, to understand the relation between the realms of science and politics.
- 24 This amount has been increased over the years.
- 25 This term was used frequently by both scientists and technical staff in relation to fieldwork.
- 26 These interviews were conducted with retired FRAD heads in December 2017, January and February 2018.

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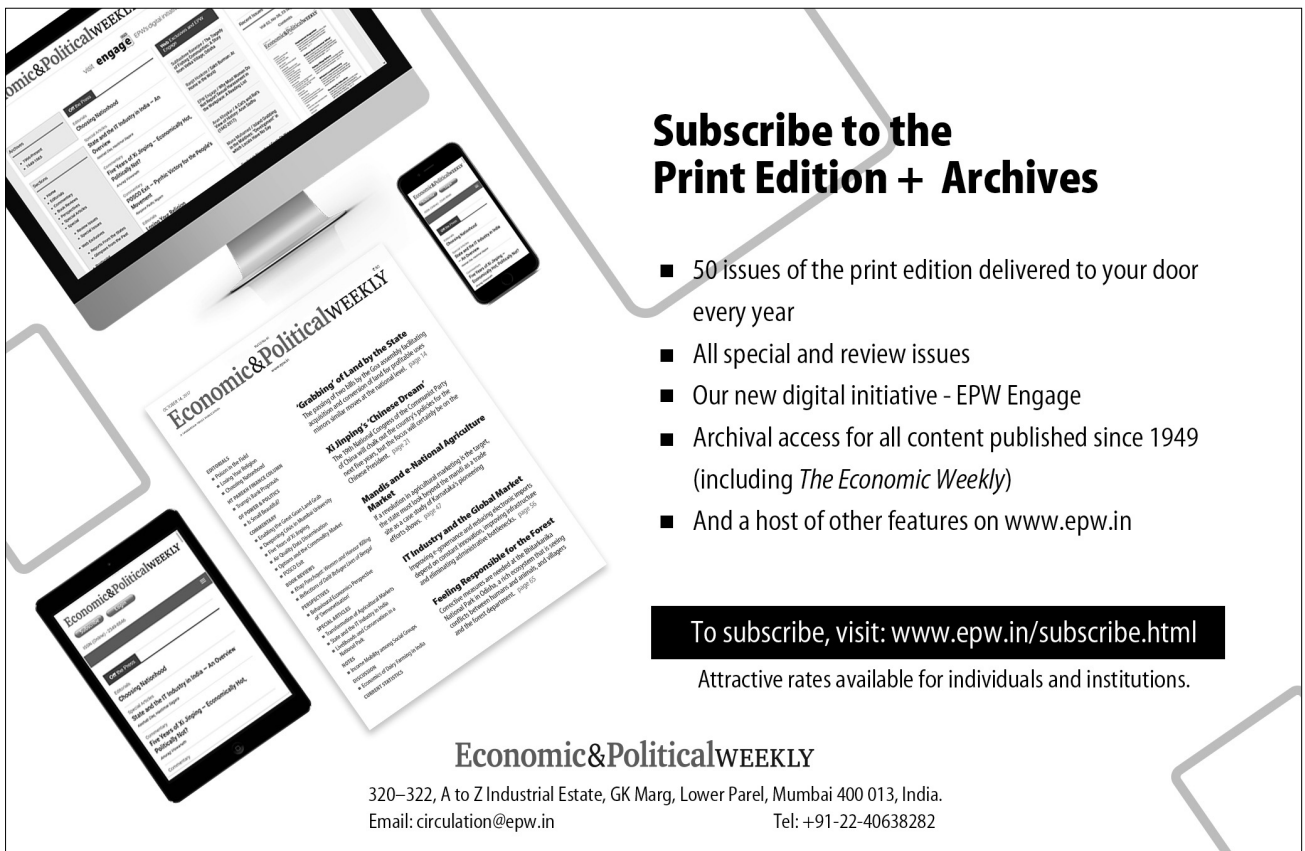
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