

Supplementary Material

Table S1. Water quality data of offshore coastal water and forebay (pump house)

S No.	Parameter	Ambient Seawater Mean (SD values)	Forebay Seawater Mean (SD values)
1	Temperature (°C)	26.8 (±0.4)	26.7 (±0.3)
2	Dissolved Oxygen (mg l ⁻¹)	6.3 (±0.6)	5.9 (±0.3)
3	Salinity (g kg ⁻¹)	32.1 (±1.9)	31.8 (±1.8)
4	Seston (mg l ⁻¹)	52.6 (±18.2)	86.2 (±25.2)
5	Combustible matter (%)	5.0 (±1.5)	26 (±9.3)
6	Particulate organic matter (µg C l ⁻¹)	7.6 (±3.0)	15.7 (±2.2)
7	Chlorophyll a (mg m ⁻³)	4.9 (±1.9)	1.4 (±0.8)
8	Phosphate (µg at l ⁻¹)	3.2 (±2.2)	12.5 (±5.2)
9	Silicate (µg at l ⁻¹)	523 (±37)	322 (±27)
10	Nitrate (µg at l ⁻¹)	36.8 (±8.0)	45 (±20)
11	Nitrite (µg at l ⁻¹)	10.9 (±1.2)	11.5 (±1.5)
12	Ammonia (µg at l ⁻¹)	28.2 (±13.7)	64.5 (±19.7)
13	Diatom count (cells ml ⁻¹)	2800 (±47)	390 (±19)
14	Total cultivable bacteria (cfu ml ⁻¹)	2.7x10 ⁴ (±280)	2700 (±363)

Table S2. A comparative account of biofouling data from present study and from various studies reported in literature

Parameters	Data Source													Present Study
	Ref (a)	Ref (b)	Ref (c)	Ref (d)	Ref (e)	Ref (f)	Ref (g)	Ref (h)	Ref (i)	Ref (j)	Ref (k)	Ref (l)	Ref (m)	
Time Period	1976-1979	1983	1988	1988	1990	1991	1997	2008	2010	2010	2013	2015	2015	2019
Number of species	NR	NR	NR	26	21	NR	105	25	60	30	NR	57	100	46
Biomass Details (Monthly)	5 (kg m ⁻²)	4 (kg m ⁻²)	5.1 (kg m ⁻²)	NR	6.5 (kg m ⁻²)	4.3 (kg m ⁻²)	12 (kg m ⁻²)	Not Recorded	140,000 (Nos m ⁻²)	7.0 (kg m ⁻²)	7.6 (kg m ⁻²)	7.9 (kg m ⁻²)	110,000 (Nos m ⁻²)	6 (kg m ⁻²)
Major fouling organisms	Mussels, Hydroids, Barnacles, Molluscans	Mussels, Oysters, Barnacles	Barnacles, Hydroids,, Anemone, Ascidiens, Mussels	Annelids, Arthropoda, Coelentrata, Molluscans	Barnacles, Hydroids,, Anemone, Ascidiens, Mussels	Barnacles, Hydroids, Anemone, Ascidiens, Mussels	Barnacles, Hydroids, Ascidiens, Mussels	Algae, Sponges, Hydroids, Molluscans, Barnacles, Amphipods, Bryozoans, Ascidiens	Bryozoans, Cirripedes, Ascidiens, Hydroids, Molluscans, Bryozoans, Polychaetes	Barnacle, Mussels, Oysters, Anemones, Hydroids	Barnacle, Mussels, Oysters, Polychaetes, Ascidiens	Barnacle, Mussels, Oysters, Anemones, Hydroids	Isopods, Amphipods, Cirripedes, Polychaetes, Serpulids	Brown Mussels, Oysters, Bryozoans, Green Mussels
Climax Community	Barnacles	Barnacles	Barnacles	Tubularia and Bivalves	Green Mussels	Green Mussels	Green Mussels	NR	Polychaetes	Green Mussels	Barnacles	Green Mussels	Mytilopsis species	Green Mussels
Location	Kalpakkam, India	Kalpakkam, India	Kalpakkam, India	Quequen, Argentina	Kalpakkam, India	Kalpakkam, India	Kalpakkam, India	Australian-Navy, Victoria, Australia	Mumbai, India	Kalpakkam, India	Ennore, India	Kalpakkam, India	Visakhapatnam, India	Kalpakkam, India

References: [a] Godwin, 1980; b) Karande & Swamy, 1988; c) Nair et al., 1988; d) Brankenvich et al., 1988; e) Sasikumar et al., 1990; f) Rajagopal et al., 1991; g) Rajagopal et al., 1997; h) Montelli & Lewis, 2008; i) Swamy et al., 2010; j) Satpathy et al., 2010; k) Vedaprakash et al., 2013; l); Rao, 2015; m) Pati et al., 2015].

Table S3. Data on biofouling biomass recorded over the years with ARIMA model values (This data was used to generate Figure 7)

S. No.	Years	Biofouling Load (kg/m ²)	ARIMA
1	1979	5.000	5.000
2	1983	4.000	4.796
3	1986	5.100	4.572
4	1988	4.800	5.276
5	1990	6.500	4.726
6	1991	4.300	5.849
7	1994	5.200	4.321
8	1997	12.000	6.373
9	2000	6.600	7.432
10	2001	5.600	5.057
11	2002	6.000	8.524
12	2004	7.300	6.987
13	2006	9.000	8.627
14	2007	8.200	7.439
15	2008	9.200	7.798
16	2009	8.300	8.249
17	2010	7.000	8.089
18	2011	7.900	8.444
19	2012	7.500	8.850
20	2013	7.600	8.126
21	2014	5.000	8.359
22	2015	6.400	6.736
23	2017	8.300	7.976
24	2019	6.000	6.644
25	2021	---	6.083
26	2023	---	6.543
27	2025	---	6.218
28	2027	---	6.218

Table S4. A time series moving average analysis for estimating biofouling biomass error

Moving Average Period	Moving Average Error (%)	Prediction for 2020 (%)
2 years	20	7.19
3 years	19	6.9
4 years	18	6.43
5 years	16	6.66

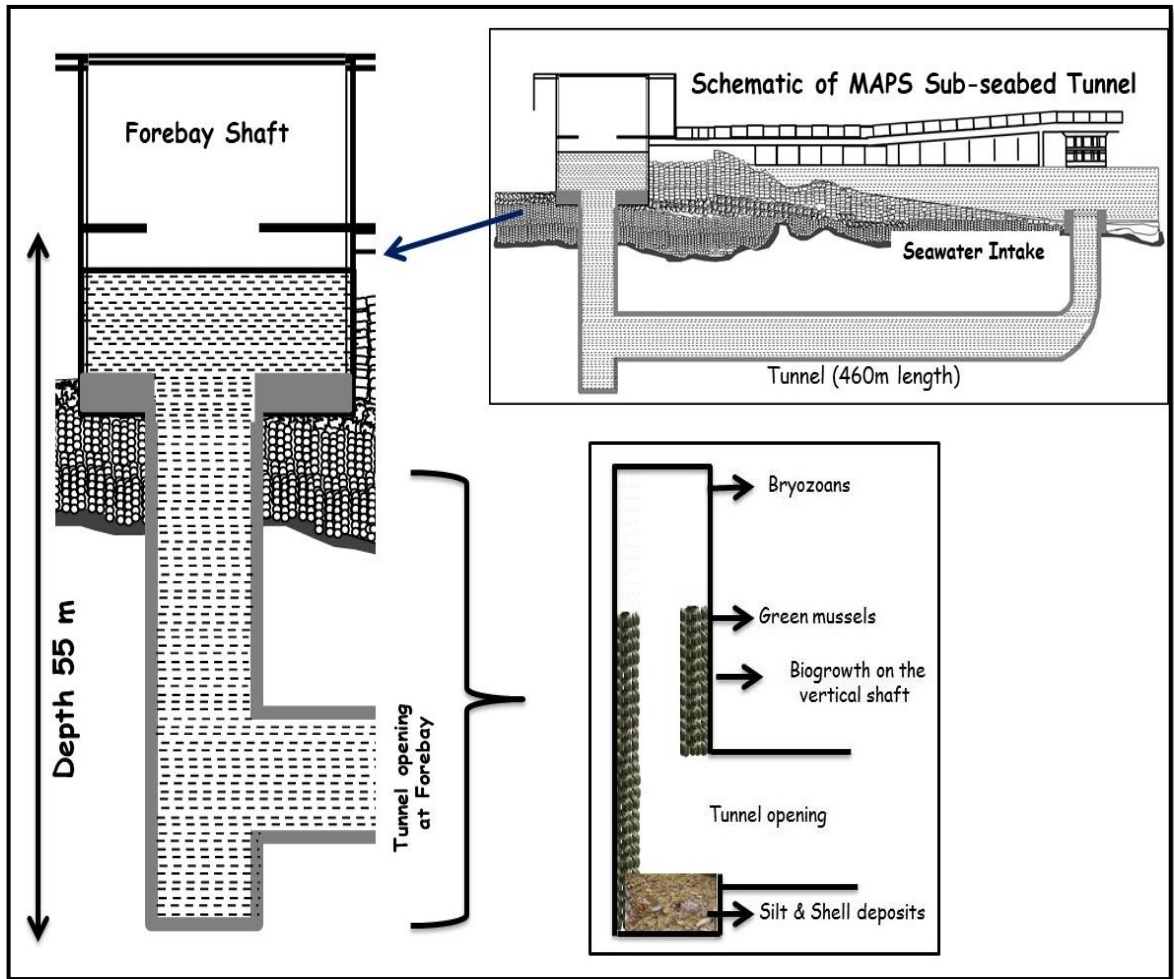


Figure S1: Schematic of the sub-seabed tunnel of the power plant cooling water system and details of the forebay shaft inspected by the diving team and digital camera.

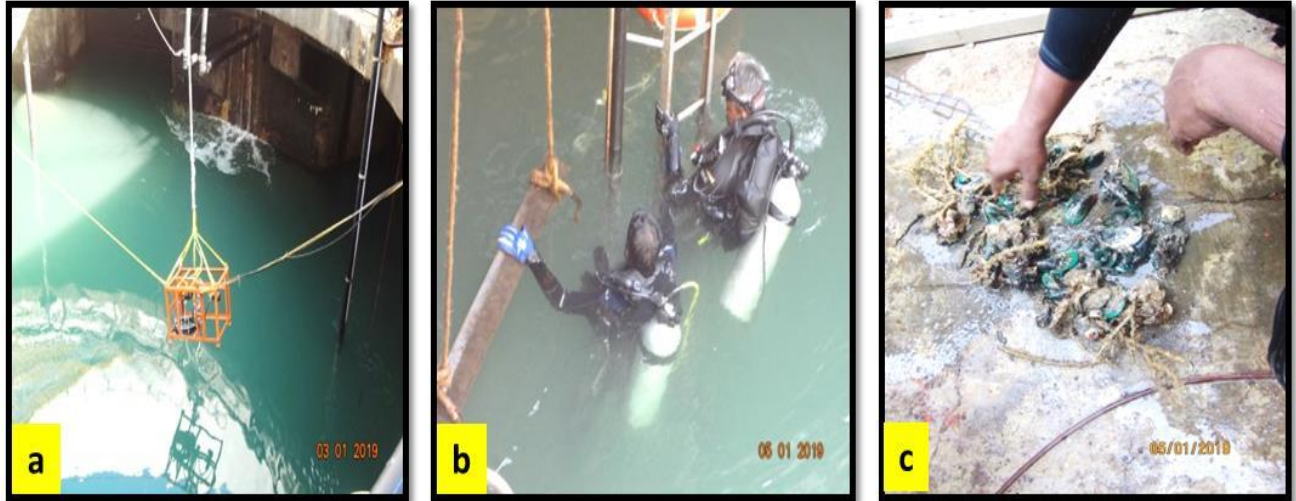


Figure S2: Deployment of an underwater camera at the pump house on 03-01-2019. The experimental skid specially designed with two underwater cameras, one online and other offline with LED lighting rated for 6000 m depth. SCUBA diving inspection and sample collection by the team at pump house of the vertical shaft.

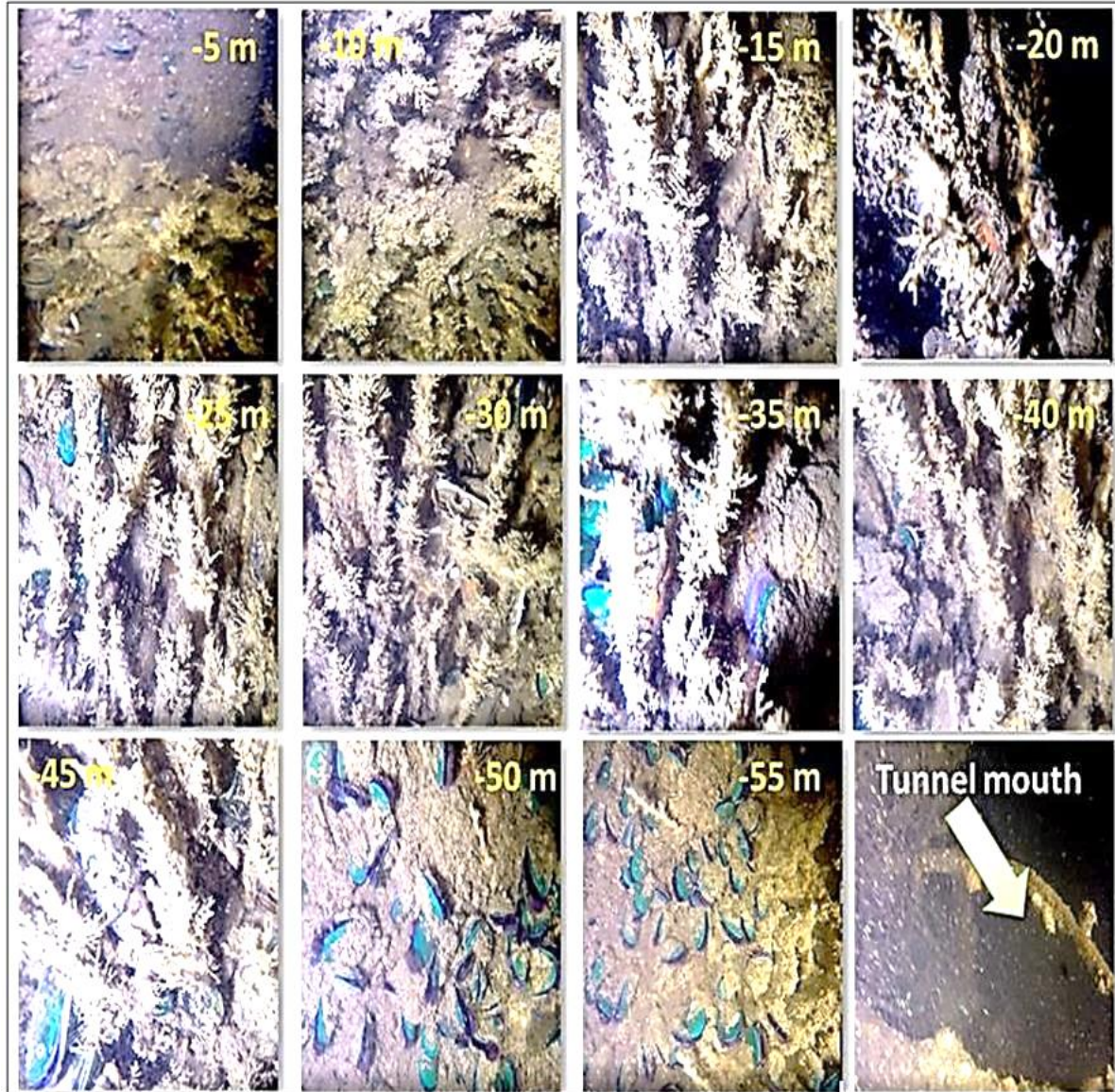


Figure S3: Biofouling in power station forebay vertical shaft, recorded using underwater digital camera at various depths (-5 to -55 m depth).

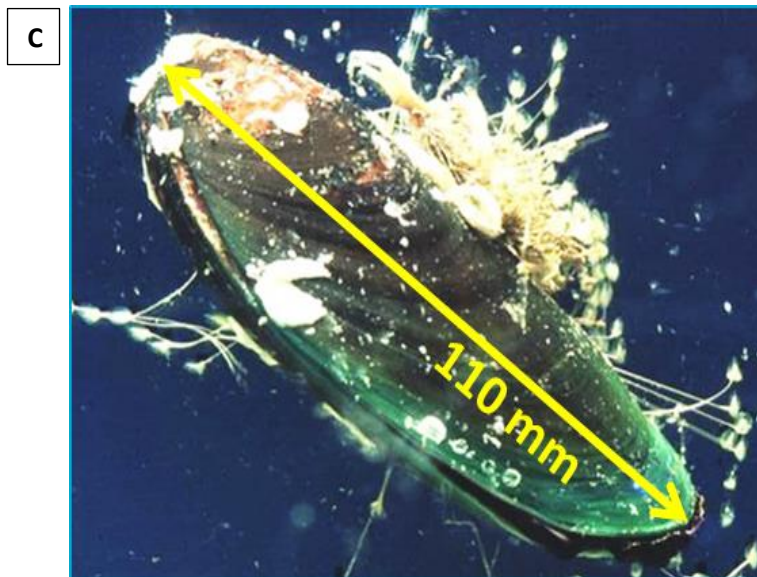
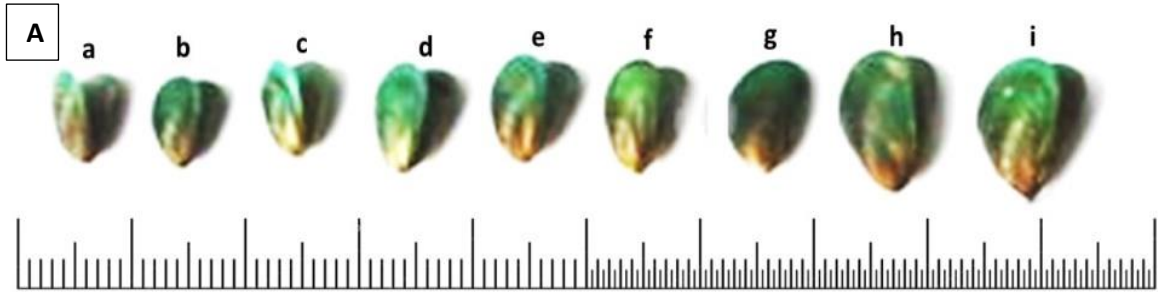


Figure S4 (A – C): Different shell sizes (10-30 mm) of green mussel segregated from the biogrowth sample collected from 15m depth of the vertical shaft (S4A-B). Figure S4-C shows the maximum mussel shell size (110 mm) observed in the present study.

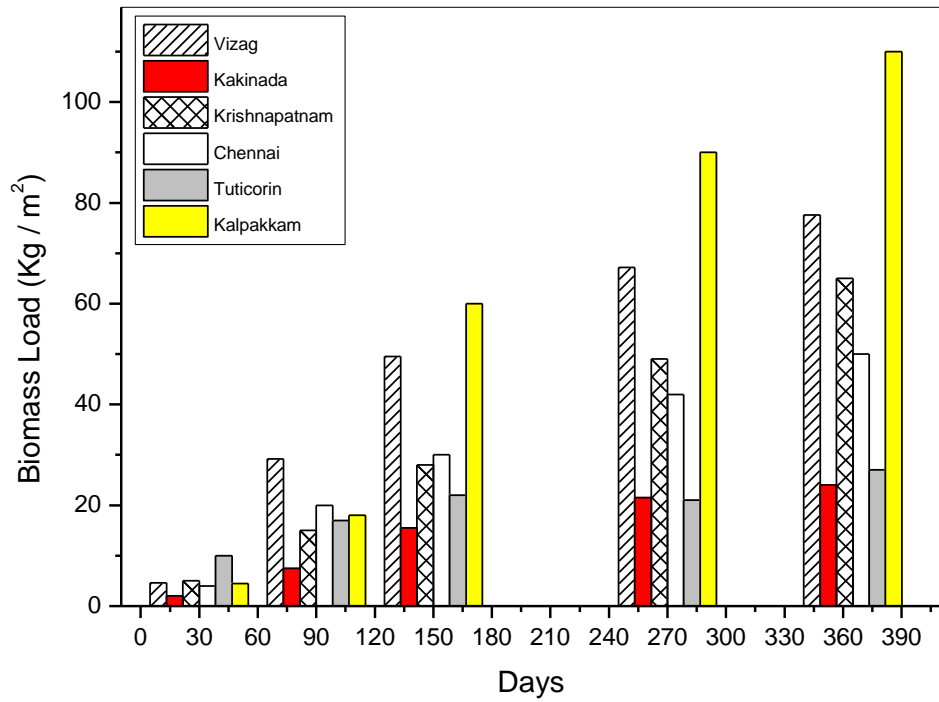


Figure S5. Biofouling load reported at different location of East coast of India (Source: Karande & Swamy, 1988; Nair et al., 1988; Vedaprakash et al., 2013; Rao, 2015; Pati et al.,2015).