Chapter 6

Post Tsunami Land Use Scenario

6.1 General

Tsunami is a Japanese word which translates as “harbor wave”, now used internationally, refers to a series of waves traveling across the ocean with extremely long wavelength at an average speed of 800 km/hour in the open ocean. As it approaches the coast, the nearshore bathymetry significantly increases the wave height resulting in inundation of low lying areas along the coast resulting in mass destruction and in many instances loss of life. A Tsunami on 26th December 2004 by an earthquake of magnitude M 9.0 occurred along the plate boundary marked by subduction zone between the Indian plate and the Burmese micro plate near Sumatra Island of Indonesia with the epicenter located on the shallow depths of seabed. Tsunami waves hit the Andaman and Nicobar group of islands within few minutes. The Tsunami waves hit Indonesia, Andaman and Nicobar islands, parts of East coast of India, Thailand, Sri Lanka, Maldives and, West and East Africa. The Survey of India reported that the Tsunami hit Cuddalore at 08.00 a.m. (IST), Chennai at 08.40 a.m. (IST), and Paradip, Machillipatanam, Nagapattinam and Vishakhapatnam at 09.00 a.m. (IST). The Great Sumatra earthquake of 26th December 2004 did not cause shaking-induced damage to the mainland of India, but the consequent Indian Ocean tsunami had a significant effect on the southern peninsular region of India. In India, the states of Tamil Nadu, Andhra Pradhesh and the Union territory of Andaman and Nicobar islands were the worst affected by the impact of Tsunami. The western state of Kerala and the Union Territory of Pondicherry were also affected. Among the different districts in Tamil Nadu, Nagapattinam is one of the worst affected districts by the Tsunami. Major changes to land use and land cover due to Tsunami were found

along coastline of Nagapattinam district. The damage does not occur in a uniform manner, but is determined (among other factors) by the orientation of the coastline with respect to the direction of the Tsunami wave propagation as well as the topography of the land and the seabed in the coastal margins. Since the area under study comes under the severely affected area, the land use map was derived from IRS P6, LISS III Geocoded data for the year 2006 using visual interpretation technique. The changes occurred in study area due to tsunami were discussed by intersecting the land use maps of the year 2004 (Pre Tsunami data) and 2006 (Post Tsunami data) and the discussion follows:

6.2 Land Use Change Analysis

The Change matrices explaining the different conversions during the period 2004 – 2006 were shown in tables 6.1 to 6.13.The reasons for the changes were discussed for the study area according to land use category:

6.2.1 Built-up land

There is a fluctuation in the shift of the built-up area in the study areas of the Tharangambadi Taluk. Mostly, the villages show a decrease in shift of this land use category except Manikkapangu and Pillaiperumanallur. The key decrease is observed in Sattangudi with 11.47 % of the total area. Here the scrubland, cropland, fallow / harvested land and agricultural plantations are captured by the settlements. Maruthampallam and Kalamanallur also show a marginal decrease of 1.38 % and 0.56 % of the total area in which sandy area, saltpan / aquaculture, scrubland, cropland, fallow / harvested land and agricultural plantations were occupied by the settlements. Only Manikkapangu and Pillaiperumanallur show a slight increase in the Built-up

Table 6.1 Land use Change Matrix for Sattangudi village from 2004 to 2006

Land use category	Sandy area	Built-up area	Water logged area	Tank	Scrub land	Cropland	Fallow/ harvested land	Agricultural plantations	River	Area for 2004 in m^2
Sandy area	325426	0	0	2473	0	6183	0	2311	1560	337953
Built-up area	512556	927028	0	0	0	0	0	0	0	1439585
Water logged area	168294	0	0	0	0	90073	0	1824	12468	272658
Tank	0	0	0	2720	0	0	0	0	0	2720
Scrub land	75306	14591	0	0	0	15951	0	0	18919	124767
Cropland	0	26338	0	90250	0	937053	0	52447	0	1106089
Fallow/ harvested land	193766	31484	0	3586	0	75800	0	19586	247	324469
Agricultural plantations	51069	2473	0	124	0	42908	0	0	0	96574
River	35661	0	0	0	0	0	0	0	75628	111289
Area for 2006 in m^2	1362078	1001915	0	99153	0	1167969	0	76167	108822	**3816104**

Table 6.2 Land use Change Matrix for Manikkapangu village from 2004 to 2006

Land use category	Sandy area	Built-up area	Salt pan / Aquaculture	Water logged area	Tank	Scrub land	Cropland	Fallow/ harvested land	Agricultural plantations	Salt affected land	Area for 2004 in m^2
Sandy area	577255	4575	53542	0	2968	0	30767	0	29169	0	698276
Built-up area	72830	1089645	0	0	0	0	0	0	0	0	1162475
Salt pan /Aquaculture	114	0	148890	0	0	0	0	0	0	0	149004
Water logged area	25720	0	378012	0	0	0	0	0	1855	0	405586
Tank	0	0	0	0	0	0	0	0	0	0	0
Scrub land	0	0	0	0	0	0	0	0	0	0	0
Cropland	0	71472	768017	0	4204	54655	258153	0	33671	0	1190174
Fallow/ harvested land	294668	44763	1018047	0	7812	93780	644079	0	163767	0	2266917
Agricultural plantations	25720	49984	49462	0	0	0	113150	0	36568	0	274884
Salt affected land	0	13849	309136	0	0	0	1237	0	2349	0	326571
Area for 2006 in m^2	996308	1274288	2725106	0	14984	148435	1047386	0	267380	0	**6473887**

Table 6.3 Land use Change Matrix for Pillaiperumanallur village from 2004 to 2006

Land use category	Sandy area	Built-up area	Salt pan / Aquaculture	Tank	Scrub land	Cropland	Fallow /harvested land	Agricultural plantations	Salt Affected land	River	Area for 2004 in m^2
Sandy area	128985	0	1965	0	0	0	0	0	0	0	130950
Built-up area	382979	577197	0	0	0	0	0	0	0	0	960176
Salt pan / Aquaculture	239166	0	625055	0	0	0	0	247	0	1607	866075
Tank	0	0	0	0	0	0	0	0	0	0	0
Scrub land	1731	0	0	0	0	0	0	0	0	0	1731
Cropland	0	462838	147272	60962	564606	1431910	0	672026	0	21189	3360803
Fallow /harvested land	951644	122171	585627	26586	853092	57129	0	429080	0	0	3025329
Agricultural plantations	78892	0	127364	0	30066	1783	0	43827	0	0	281932
Salt affected land	32521	0	0	0	0	0	0	371	0	0	32892
River	7667	0	5193	0	0	0	0	10637	0	45505	69002
Area for 2006 in m^2	1823585	1162206	1492477	87547	1447764	1490822	0	1156189	0	68301	**8728890**

Table 6.4 Land use Change Matrix for Maruthampallam village from 2004 to 2006

Land use category	Sandy area	Built-up area	Salt pan / Aquaculture	Tank	Scrub land	Cropland	Fallow /harvested land	Agricultural plantations	Salt affected land	River	Area for 2004 in m^2
Sandy area	73945	5906	0	0	0	0	0	7172	0	1637	88660
Built-up area	196363	470258	0	0	0	0	0	0	0	0	666621
Salt pan / Aquaculture	140842	1855	432790	76418	0	12879	0	18908	0	39893	723587
Tank	0	0	0	1731	0	495	0	0	0	0	2226
Scrub land	0	0	0	0	0	0	0	0	0	0	0
Cropland	0	4081	3215	12984	306539	756086	0	388335	0	13849	1485089
Fallow /harvested land	517865	93359	15828	247	176702	305103	0	214500	0	37708	1361311
Agricultural plantations	211449	19908	6925	0	6801	7296	0	96450	0	32274	381103
Salt affected land	111660	0	40701	1978	48473	14962	0	28917	0	17930	264620
River	34623	0	15086	1237	0	0	0	20155	0	119080	190180
Area for 2006 in m^2	1286748	595366	514544	94596	538515	1096820	0	774438	0	262371	**5163398**

Table 6.5 Land use Change Matrix for Kalamanallur village from 2004 to 2006

Land use category	Sandy area	Built-up area	Salt pan / Aquaculture	Tank	Scrub land	Cropland	Fallow /harvested land	Agricultural plantations	Salt affected land	River	Area for 2004 in m^2
Sandy area	131198	0	1113	0	0	0	0	3880	0	18501	154692
Built-up area	127100	357791	0	0	0	0	0	0	0	0	484892
Salt pan / Aquaculture	146901	2102	106095	0	33639	20898	0	107945	0	2968	420549
Tank	124	0	0	0	0	1731	0	0	0	0	1855
Scrub land	199702	13231	276244	2597	60097	110300	0	74810	0	1608	738588
Cropland	0	44145	77408	0	8779	398909	0	61697	0	748	591686
Fallow /harvested land	74687	42537	48349	0	103993	135414	0	64977	0	31461	501419
Agricultural plantations	2226	7295	45381	0	0	0	0	2597	0	0	57499
Salt affected land	86681	0	0	0	0	5565	0	0	0	0	92246
River	59973	0	10140	0	0	0	0	617	0	63311	134041
Area for 2006 in m^2	828592	467101	564730	2597	206509	672816	0	316525	0	118596	**3177466**

Table 6.6 Land use Change Matrix for Vanagiri village from 2004 to 2006

Land use category	Sandy area	Built-up area	Salt pan / Aquaculture	Tank	Scrub land	Cropland	Fallow / Harvested land	Agricultural plantations	Salt affected land	River	Area for 2004 in m^2
Sandy area	459369	11445	3298	0	0	154	0	0	49259	14244	541854
Built-up area	660525	705459	0	0	0	0	0	0	0	0	1365984
Salt pan / Aquaculture	91954	497062	138809	0	2629	142165	0	0	0	239293	1132551
Tank	8569	4560	7460	0	0	9675	0	3493	0	0	33758
Scrub land	147929	0	7045	0	0	49079	0	225604	27370	0	457027
Cropland	100231	234599	51116	0	45217	538228	13	221793	0	31004	1222200
Fallow / Harvested land	296886	598845	58756	2100	0	787493	0	156549	0	32584	1933213
Agricultural plantations	308081	133093	9951	4574	0	291295	315	100227	0	10502	858038
Salt affected land	27293	9818	1696	0	0	48886	0	102858	0	0	190551
River	35517	0	7553	0	0	14934	0	86152	0	26735	170890
Area for 2006 in m^2	2136355	2194881	285685	6674	47845	1881908	327	921398	76630	354362	**7906065**

Table 6.7 Land use Change Matrix for Kilaiyur village from 2004 to 2006

Land use category	Sandy area	Built-up area	Salt pan / Aquaculture	Waterlogged area	Tank	Scrub land	Crop land	Fallow /harvested land	Agricultural plantations	Salt affected land	Area for 2004 in m^2
Sandy area	207352	5935	87655	0	0	0	30536	0	1998	0	333478
Built-up area	386100	1592741	0	0	0	0	0	0	0	0	1978841
Salt pan / Aquaculture	36725	19785	969080	0	2968	68505	75955	0	82817	0	1255834
Waterlogged area	103622	3215	337700	0	895	0	11842	0	143686	0	600960
Tank	2844	3462	0	0	1113	0	5688	0	1607	0	14715
Scrub land	0	0	0	0	0	0	0	0	0	0	0
Cropland	0	310125	27328	0	2473	176561	424634	0	541742	0	1482864
Fallow /harvested land	335969	26834	65961	0	3462	199949	487569	168541	367324	0	1655609
Agricultural plantations	172993	262889	51123	0	13726	20032	66501	0	323451	0	910715
Salt affected land	19537	0	0	0	0	49721	40930	0	46976	16817	173982
Area for 2006 in m^2	1265143	2224987	1538846	0	24636	514768	1143657	168541	1509601	16817	**8406997**

Table 6.8 Land use Change Matrix for Perunthottam village from 2004 to 2006

Land use category	Sandy area	Built-up area	Salt pan / Aquaculture	Water logged area	Tank	Scrub land	Cropland	Fallow /harvested land	Agricultural plantations	Salt affected land	River	Area for 2004 in m^2
Sandy area	404474	0	63583	0	0	0	0	0	43237	0	20196	531489
Built-up area	341841	1278897	0	0	0	0	0	0	0	0	0	1620738
Salt pan / Aquaculture	6059	0	874484	0	0	0	23277	0	4455	0	2316	910591
Waterlogged area	645476	0	876091	0	0	0	172458	0	327934	0	89810	2111770
Tank	4328	0	0	0	1978	0	0	0	255223	0	0	261529
Scrub land	600713	0	0	0	0	0	95750	0	413582	0	0	1110046
Cropland	5689	137627	435263	0	14715	0	765794	0	1266837	0	0	2625925
Fallow /harvested land	69741	0	118201	0	0	0	459760	0	356990	0	0	1004692
Agricultural plantations	273771	111165	56757	0	2964	0	150487	0	1007763	0	29701	1632609
Salt affected land	103622	0	81736	0	0	0	145918	0	53784	0	0	385060
River	180535	0	24853	0	0	0	0	0	91009	0	118958	415355
Area for 2006 in m^2	2636249	1527690	2530968	0	19658	0	1813445	0	3820814	0	260980	**12609803**

Table 6.9 Land use Change Matrix for Thennampattinam village from 2004 to 2006

Land use category	Sandy area	Built-up area	Salt pan /Aquaculture	Water logged area	Tank	Scrub land	Cropland	Fallow harvested land	Agricultural plantations	Salt affected land	River	Area for 2004 in m^2
Sandy area	145478	0	21816	0	0	0	0	0	103746	0	95843	366883
Built-up area	231190	1529772	0	0	0	0	0	0	0	0	0	1760962
Salt pan /Aquaculture	385183	18054	386767	0	58613	2968	215406	0	64300	0	144328	1275619
Waterlogged area	57128	0	200569	0	0	0	12495	0	0	0	16596	286789
Tank	0	0	0	0	0	0	3833	0	3586	0	0	7419
Scrub land	65290	25720	371	0	124	0	78397	0	67392	0	19785	257078
Cropland	0	97192	7172	0	0	46618	873868	0	485960	0	115493	1626303
Fallow harvested land	49956	13973	689250	0	0	0	44763	0	84789	0	64957	947687
Agricultural plantations	95956	16817	62446	0	6054	0	141337	0	127369	0	37096	487075
Salt affected land	31285	0	0	0	0	0	64548	0	25844	0	0	121676
River	164831	0	104488	0	0	32645	41148	0	35118	0	416250	794480
Area for 2006 in m^2	1226297	1701528	1472879	0	64790	82230	1475794	0	998104	0	910348	**7931970**

Table 6.10 Land use Change Matrix for Thirumullaivasal village from 2004 to 2006

Land use category	Sandy area	Built – up area	Water logged area	Cropland	Fallow /harvested land	Agricultural plantations	Salt affected land	River	Area for 2004 in m^2
Sandy area	198518	0	0	0	0	0	145918	137940	482376
Built –up area	701973	3249774	0	0	0	0	0	0	3951747
Water logged area	1484	0	0	0	0	0	0	19785	21269
Cropland	0	0	0	0	0	0	0	0	0
Fallow/harvested land	216890	0	0	0	0	193592	1594847	990	2006319
Agricultural plantations	564853	176331	0	44376	0	1779552	4190374	64671	6820158
Salt affected land	94448	65932	0	0	0	25596	264373	0	450349
River	50652	0	0	0	0	0	13306	179146	243105
Area for 2006 in m^2	1828819	3492037	0	44376	0	1998741	6208819	402531	**13975323**

Table 6.11 Land use Change Matrix for Vettangudi village from 2004 to 2006

Land use category	Sandy area	Built-up area	Salt pan/ Aquaculture	Tank	Scrub land	Cropland	Fallow/ harvested land	Agricultural plantations	Salt affected land	River	Area for 2004 in m^2
Sandy area	11500	0	0	3091	70276	41388	0	98054	0	0	224309
Built-up area	671388	725907	0	0	0	0	0	0	0	0	1397295
Salt pan / Aquaculture	72338	0	0	0	26226	11821	139824	147712	0	0	397920
Tank	0	0	0	0	0	0	0	0	0	0	0
Scrub land	66403	0	0	0	120569	0	16399	195786	0	0	399156
Cropland	0	0	70112	22576	799797	1247355	46618	3979940	0	0	6166398
Fallow /harvested land	1454423	0	0	5441	1573750	188820	744624	1626066	0	0	5593125
Agricultural plantations	204648	0	26957	0	204046	139111	15193	882150	0	0	1472106
Salt affected land	24484	0	0	0	0	1113	0	7172	0	0	32768
River	0	0	0	0	0	0	0	0	0	114628	114628
Area for 2006 in m^2	2505183	725907	97069	31108	2794662	1629608	962658	6936881	0	114628	**15797704**

Table 6.12 Land use Change Matrix for Tandavankulam village from 2004 to 2006

Land use category	Sandy area	Built-up area	Salt pan /Aquaculture	Water logged area	Tank	Scrub land	Cropland	Fallow / harvested land	Agricultural plantations	Salt affected land	River	Area for 2004 in m^2
Sandy area	539024	0	117210	0	0	0	0	0	183750	0	0	839984
Built-up area	181630	1271309	0	0	0	0	0	0	0	0	0	1452939
Salt pan /Aquaculture	8046	0	800153	0	0	31779	263021	0	263011	0	0	1366010
Waterlogged area	44763	0	145630	0	0	108445	0	0	221253	0	0	520090
Tank	4946	0	0	0	0	0	0	0	1978	0	0	6925
Scrub land	0	0	0	0	0	0	0	0	0	0	0	0
Cropland	0	0	158139	0	0	86186	395587	0	985772	0	0	1625684
Fallow /harvested land	132434	0	69370	0	0	973588	0	24237	598525	0	0	1798153
Agricultural plantations	186331	0	215035	0	0	112143	198510	0	1113367	0	0	1825386
Salt affected land	331889	0	0	0	0	39569	76861	0	718113	0	0	1166432
River	0	0	0	0	0	0	0	0	0	0	199578	199578
Area for 2006 in m^2	1429063	1271309	1505538	0	0	1351710	933979	24237	4085768	0	199578	**10801182**

Table 6.13 Land use Change Matrix for Pudupattinam village from 2004 to 2006

Land use category	Sandy area	Built-up area	Salt pan /Aquaculture	Water logged area	Tank	Scrub land	Crop land	Fallow harvested land	Agricultural plantations	Salt affected land	River	Area for 2004 in m^2
Sandy area	151106	10387	0	0	0	89410	0	0	27196	0	0	278099
Built-up area	146280	1389731	0	0	0	0	0	0	0	0	3115	1539126
Salt pan /Aquaculture	4328	0	425247	0	0	142450	51069	0	92123	0	0	715217
Water logged area	223196	143192	239518	0	0	168170	11376	0	1475073	0	271254	2531780
Tank	3215	17439	0	0	0	0	0	0	4695	0	0	25349
Scrub land	0	0	0	0	0	0	0	0	0	0	0	0
Crop land	0	930376	0	0	0	169036	449731	0	167923	0	0	1717065
Fallow harvested land	12242	60467	53295	0	0	165202	262147	0	113144	0	0	666497
Agricultural plantations	228019	202917	0	0	0	67144	80993	0	1470622	0	50204	2099899
Salt affected land	9892	54903	0	0	0	56634	0	0	21269	0	0	142697
River	51811	0	8532	0	0	5070	9892	0	143563	0	164089	382958
Area for 2006 in m^2	830089	2809411	726593	0	0	863116	865210	0	3515607	0	488663	**10098688**

area, of about 1.72 % and 2.31 %, where the cropland, fallow / harvested land, agricultural plantations and salt affected land are shifted to built-up areas.

There is ebb and flow in the change of built up area in the study area of the Sirkazhi taluk. The key increase is shown in Thennampattinam and Vanagiri with 12.01 % and 10.48 % of the total area, respectively. The Sandy area, Saltpan, river, tank, cropland, fallow/harvested land, agricultural plantations and salt affected land were occupied by the built-up land. Kilaiyur shows a minimal increase of 2.93 % of the total area where sandy area, saltpan, waterlogged area, tank, cropland, fallow/harvested land and agricultural plantations were occupied by the Settlements, Vettangudi, Thirumullaivasal, Tandavankulam, Thennampattinam and Perunthottam show reasonable decrease of 4.24 %, 3.29 %, 1.68 %, 0.75 % and 0.73 % of the total area, respectively. Here Saltpan, scrubland, cropland, fallow/harvested land and agricultural plantations were converted into Built-up land.

The main reason for decrease in built-up land was tsunami. Even though the available agricultural land and other land use categories were converted to built up land, the net effect is decrease in the built-up area only due to losses encountered by Tsunami. In most of the built-up land category, sandy area occupies, which has been shifted towards land due to the tsunami waves.

6.2.2 Agricultural Land

6.2.2.1 Cropland

There is an oscillation in the changes of the cropland in the study area of the Tharangambadi taluk. The key decrease observed in Pillaiperumanallur with 21.42 % of the total area. The cropland is shifted to built-up area, saltpan, tank, scrubland, agricultural plantations and river in this village Pillaiperumanallur, Maruthampallam and Manikkapangu also show a considerable decrease of 7.53 % and 2.2 % of total

area respectively, in which the cropland are converted to built-up area, saltpan, tank, scrubland, agricultural plantations and river. Only Sattangudi and Kalamanallur show a minimal increase of 1.63 % and 2.55 % of the total area, respectively. The shift is from the built-up land, saltpan, scrubland, tank, agricultural plantations and river.

There is a moderate decrease in all the villages of the Sirkazhi taluk except Vanagiri. The maximum decrease is observed in Vettangudi, with 28.72 % of the total area. The cropland is changed to salt pan, tank, scrub land, fallow/harvested land and agricultural plantations the villages Thirumullaivasal, Pudupattinam, Perunthottam, Tandavankulam, Kilaiyur and Thennampattinam also show a considerable decrease with 14.04 %, 8.43 %, 6.44 %, 6.4 %, 5.04 % and 1.99 % of the total area, respectively. The cropland has been converted to tank, agricultural plantations, fallow/harvested land and river. Vanagiri shows a typical increase of 8.34% of the total area. The cropland has been changed to sandy area, built up area, saltpan, scrubland, agricultural plantations, fallow/harvested land and river.

6.2.2.2 Fallow / Harvested land

There is a typical decrease in this category in all the villages of the study area in Tharangambadi taluk. The net decrease is observed in Manikkapangu (35.02%) and Pillaiperumanallur (34.66%), in which the fallow land has been transformed to sandy area, built-up land, saltpan, tank, scrubland, cropland, agricultural plantations and river. About 26.37% and 15.78% of the fallow / harvested land has been converted to sandy area, built up land, saltpan, tank, scrubland, cropland, agricultural plantations and river in Maruthampallam and Kalamanallur, respectively, 8.50% of total area decrease is experienced in Sattangudi where fallow / harvested land is shifted to sandy area, built-up land, tank, cropland and agricultural plantations.

There is a considerable decrease of fallow/ harvested land in all the villages of the study area in the Sirkazhi taluk. The key decrease is observed in Thirumullaivasal, Vettangudi and Vanagiri with 48.80 %, 29.31 % and 24.45 % of the total area, respectively. The fallow / harvested land has been transformed to sandy area, tank, Scrubland, cropland, built up area, Agricultural plantations and river. Kilaiyur, Tandavankulam, Thennampattinam show a vast decrease of 17.69 %, 16.43 % and 12.01 % of the total area, where fallow/harvested land has been changed to sandy area, built-up area, saltpan, tank, scrubland, cropland, agricultural plantations and river. The fallow/harvested land has been converted into sandy area, built up land, saltpan, scrubland, cropland, agricultural plantation and river, in the villages Perunthottam and Pudupattinam with a typical decrease of 7.97 % and 6.6 % of the total area, respectively.

6.2.2.3 Agricultural Plantations

There is an increase in agricultural plantations in all the villages except Sattangudi and Manikkapangu. About 10.02 %, 8.15 % and 7.62 % of the total area increase is observed in the villages Pillaiperumanallur, Kalamanallur and Maruthampallam, respectively. Here, in these villages the Agricultural plantations are changed into sandy area, built up land, saltpan, scrubland, cropland and river. A marginal decrease of 0.53 % and 0.12 % are experienced in Sattangudi and Manikkapangu, where sandy area, Built up land, saltpan, tank and cropland are transformed from the agricultural plantations.

There is a considerable increase in the agricultural plantations of the Sirkazhi taluk except Vanagiri. The key increase is observed in Vettangudi, with 34.595 of the total area. The agricultural plantation has been converted to sandy area, saltpan, scrubland, cropland and fallow/harvested land. Tandavankulam, Perunthottam,

Pudupattinam, Thirumullaivasal, Kilaiyur and Thennampattinam also show a vast increase of 20.93 %, 17.35 %, 14.02 %, 111.08 %, 7.13 % and 6.41 % of the total area, respectively. Here the agricultural plantations are transformed to sandy area, built up land, saltpan, tank, scrubland, cropland, agricultural plantations, fallow/harvested land and river. Vanagiri shows a marginal decrease of 0.8%, where the agricultural plantations are converted into sandy area, built-up land, saltpan, tank, cropland, fallow/harvested land and river.

The harbor wave affected the agricultural and horticultural croplands by means of seawater intrusion. The invasion and receding action of harbor waves lead to the removal of soil by erosion and deposition of large amounts of sand, salt and other debris. Paddy fields are affected by erosion, salt deposition, water logging and other deposited sediment. The widening of canals, tanks and newly formed brackish water channels occupied some area in paddy fields.

6.2.3 Wasteland

6.2.3.1 Salt affected land

The salt affected land shows a vast decrease in all the villages of Tharangambadi taluk. The key decrease is visualized in Maruthampallam and Manikkapangu with 5.13% and 5.04% of the total area respectively. The salt affected land is shifted to sandy area, built-up land, saltpan / aquaculture, Tank, cropland, scrubland, agricultural plantations and river in these villages. About 2.9% and 0.38% of total area decrease in salt affected land is observed in Kalamanallur and Pillaiperumanallur respectively. The salt affected land was transformed to sandy area, cropland and agricultural plantations. The salt affected land category remains unchanged during this period in Sattangudi villages.

There is a moderate decrease in all the villages of the study area in the Sirkazhi Taluk. The net decrease is observed in Tandavankulam, with 10.8% of the total area. The salt affected land has been changed to sandy area, scrubland, cropland and agricultural plantations. Perunthottam and Vettangudi shows typical decrease in the salt affected land with 3.05 %, 1.87 %, 1.54 %, 1.44 %, 1.41 % and 0.21 % of the total area, respectively. Sandy area, built up land, saltpan, scrubland, cropland, agricultural plantations and river. The salt affected land has been converted to sandy area, built up land, scrub land, cropland, saltpan, agricultural plantations and river. The only village which shows increase in salt affected land category with 44.43% of total area in Thirumullaivasal. Here, it has been transformed to sandy area, built up land and agricultural plantations.

Pumping of water after tsunami has reduced the salinity levels in the well water samples and as well as in the open ponds. This initiates the reclamation of salt affected land to a suitable land for even agriculture so that these categories have given up the area to agriculture land also.

6.2.3.2 Waterlogged area

Sattangudi and Manikkapangu of Tharangambadi show a regional decrease of 7.14% and 6.26% of the total area respectively. Here, the waterlogged area has been transformed to sandy area, saltpan, cropland, agricultural plantations and river. Pillaiperumanallur, Maruthampallam and Kalamanallur shows neither increase nor decrease in the shift of the water logged area during this period.

There is a typical decrease in the waterlogged area of the Sirkazhi Taluk. The large decrease is observed in Pudupattinam with 25.07 % of the total area. The waterlogged area is changed into sandy area, built up land, saltpan, scrubland, cropland, agricultural plantations and river. The villages Perunthottam, Kilaiyur,

Thennampattinam and Thirumullaivasal show considerable decrease with 16.75 %, 7.15 %, 3.63 % and 0.15 % of the total area has been converted to sandy area, built up area, saltpan, cropland, tank, agricultural plantations and river. Vanagiri, Vettangudi and Tandavankulam show neither increase nor decrease in the shift of the water logged area during this period.

6.2.3.3 Scrubland

There is an increase in scrubland in the study area except Sattangudi and Kalamanallur of Tharangambadi taluk. The key increase is observed in Pillaiperumanallur where 16.57 % of the scrubland has been shifted. Maruthampallam and Manikkapangu also show a typical increase of 10.43 % and 2.29 % respectively of the total area. A large decrease of about 16.74 % is visualized in Kalamanallur where the scrubland has been changed to sandy area, built-up land, saltpan / aquaculture, tank, cropland, river and agricultural plantations. Sattangudi underwent a 3.27 % decrease in scrubland, where sandy area, built-up land, cropland and river occupied the scrubland.

There is a moderate increase and decrease in the villages under study area of the Sirkazhi Taluk. The key increase is in Vettangudi with 17.69 % of the total area. The scrubland were changed into sandy area, fallow / harvested land and agricultural plantations. Tandavankulam, Pudupattinam and Kilaiyur shows typical increase of 12.45 %, 8.55 % and 6.12 % of the total area, respectively. In the villages Perunthottam, Thennampattinam and Vanagiri the scrubland has been transformed into sandy area, saltpan, cropland, agricultural plantations and salt affected land with regional decrease of 8.80 % and 5.17 % of the total area, respectively.

The surface water resources meant for irrigation and drinking were affected by the ingress of seawater in all the areas. The massive quantity of seawater that

inundated the coastal agricultural lands for 0.5 to 2.0 km area inland, due to reasons of poor drainage, stood for a few days affecting the quality of soil and groundwater. The electrical conductivity (EC) of soil and shallow groundwater increased by about ten times and 15 times, respectively and the degree of variations differed from place to place. From interaction with the local inhabitants, it is learnt that not only have the field crops been affected, but drinking water available in shallow *katcha* wells or irrigation water in ponds have also been contaminated due to sea water ingression. (Chandrasekharan etal. 2005). So, this forms the reason for conversion of other lands to scrub land. In some places, due to consistent pumping, the quality of water changes and falls within the standards and hence, scrub was converted to mostly agricultural land.

6.2.3.4 Sandy area

There is a considerable increase in all the villages in the sandy area in Tharangambadi taluk. The net increase is in Sattangudi is 26.83% of total area. Here, sandy area has been captured by tank, cropland, agriculture plantations and river. Maruthampallam, Kalamanallur and Pillaiperumanallur also show a vast increase of 23.2 %, 21.21 % and 19.39 % o the total area, respectively. Here, the transformations of the sandy area are saltpan, built-up land, agricultural plantations and river. The sandy area has been converted into built-up land, saltpan, tank, cropland and agricultural plantations in the village Manikkapangu with a net increase o 4.6% of the total area.

There is a considerable increase in all the villages in the sandy area in Sirkazhi taluk. The key increase is in Vanagiri, with 20.17% of the total area. Here, Sandy area has been converted into built up area, saltpan, salt affected land, cropland and river. Perunthottam, Vettangudi, Kilaiyur, Thennampattinam and Thirumullaivasal also

show a vast increase of 16.7 %, 14.44 %, 11.08 %, 10.81 % and 9.64% respectively. Here the transformations of the sandy area are to saltpan, built-up area, cropland, tank, scrubland, agricultural plantations, salt affected land and river. The sandy area has been changed into built-up area, saltpan, scrubland and agricultural plantations in the villages Pudupattinam and Tandavankulam, with a regional increase of 5.45 % of the total area, respectively.

The shift of sand towards land due to receding action of tsunami waves was the main reason for increase in sandy area. Due to tsunami the collapsed built-up area is occupied by sandy area.

6.2.4 Water bodies

6.2.4.1 River

There is a marginal decrease in all the villages of the study area except Maruthampallam in the Tharangambadi taluk. About 0.49 %, 0.05 % and 0.01 % of the total area decrease is observed in the category of river in the villages Kalamanallur, Sattangudi and Pillaiperumanallur, respectively. River has been transformed to sandy, saltpan and agricultural plantations in these villages. Maruthampallam shows a slight increase of about 1.4 % of total area in river. The river in this village has been changed to sandy area, saltpan, tank and agricultural plantations. Manikkapangu shows no change in river during this period.

There is a considerable increase in the study area except Perunthottam. The key increase is observed in Vanagiri, with 2.32 % of the total area. The rivers are converted into sandy area, saltpan, cropland, and agricultural plantations. Thennampattinam, Thirumullaivasal and Pudupattinam shows minimal increase of 1.42%, 1.14% and 1.05%. The rivers were changed to sandy area, saltpan, scrubland, cropland and agricultural plantations. The river has been converted to sandy area,

saltpan and agricultural plantations in the village Perunthottam, with a net decrease of 1.22 % of the total area. Kilaiyur, Vettangudi and Tandavankulam show no change during this period.

The intrusion and receding action of the waves caused widening of canals in some parts of the study area. Deposition of sand particles in canal and water body decreases water-spread area in some parts of the study area.

6.2.4.2 Tank

There is an increase in the land use category, tanks in all the villages of the study area in Sattangudi taluk. The maximum increase is in Sattangudi village, where 2.53 % of the total area has been shifted. About 1.79 % and 1.00 % the tank has been changed into crop in Maruthampallam and Pillaiperumanallur. A marginal increase of 0.23 % and 0.02 % shift of tank to sandy area and cropland has been reviewed in Manikkapangu and Kalamanallur.

There is a decrease in the land use category of tank, except the villages Kilaiyur and Thennampattinam. The key decrease is in Tandavankulam, where 4.82 % of the total area has been shifted to sandy area and agricultural plantations. About 2.33 %, 1.91 %, 0.35 % and 0.25 % of the total area has been changed to sandy area, built-up area, saltpan, cropland and agricultural plantations in the villages Vettangudi, Perunthottam, Vanagiri and Pudupattinam, respectively. A marginal increase of 0.73 % and 0.11 % is observed in Thennampattinam and Kilaiyur. The Tank has been changed to sandy area, built-up area, cropland and agricultural plantations.

The encroachment of tank by human being decreases the area of the tank. In some places, new tanks have been drilled to put up more area in tanks. But the net result is water from the tanks is not found suitable for drinking (According to VAO’s statement).

6.2.5 Saltpan / Aquaculture

There is a typical increase in the shift of saltpan except in the village Maruthampallam, in the study area of Tharangambadi taluk. The net increase is observed in Manikkapangu with 39.71 % of the total area. The saltpan has been transformed to sandy area. Pillaiperumanallur and Kalamanallur shows a usual increase of 7.18 % and 4.53 % of the total area, respectively, where the saltpan is shifted to sandy area, built-up land, scrub land, cropland, agricultural plantations and river. Maruthampallam shows a small decrease of 4.05% of the total area. The saltpan has been occupied by sandy area, built up area, tank, cropland, agricultural plantations and river. The Sattangudi shows no change in saltpan during this period.

The saltpan has changed considerably in the study area of the Sirkazhi Taluk. There has been a vast increase in the change of saltpan except the villages Vanagiri and Vettangudi the net increase is observed in Perunthottam with 12.85 % of the total area. The saltpan has been converted to sandy area, cropland, agricultural plantations and river. Kilaiyur, Thennampattinam and Tandavankulam shows an usual increase of 3.36 %, 2.41 % and 1.29 % of the total area respectively, where the saltpan, is transformed to sandy area, built up land, tank, scrubland, cropland, agricultural plantations, fallow/harvested land and river. Pudupattinam shows a marginal increase of 0.11% of the total area. In Pudupattinam the saltpan is shifted to sandy area, scrubland, cropland and agricultural plantations. The saltpan / aquaculture has been changed to sandy area, built-up area, scrubland, cropland, fallow/harvested land, agricultural plantations and river in the villages Vanagiri and Vettangudi with a regional decrease of 10.72 % and 1.91 % of the total area, respectively.

Even though the entire saltpan / aquaculture area was lost during tsunami, the area occupied from them goes on increasing. After Tsunami, the owners of aqua

farms have bought most of the agricultural land and other lands, for very lesser cost since people sell their land as they move out for survival crediting to the increase in aquaculture. But most of the lands under aquaculture are found uncultivated due to the coastal regulations imposed on them.