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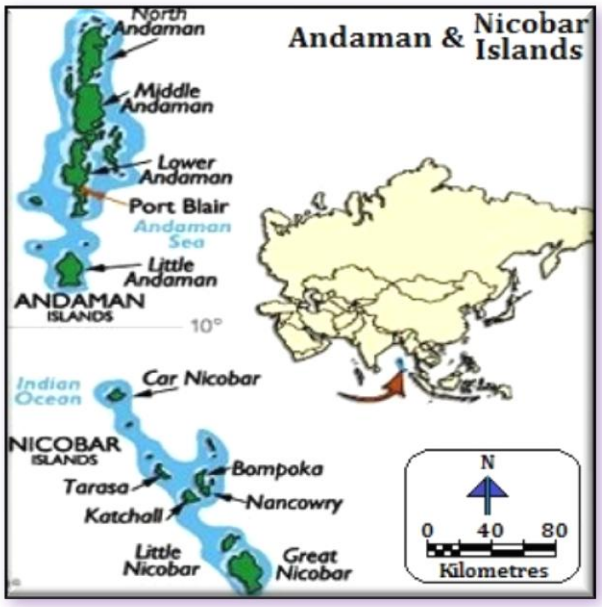
Government of India
MINISTRY OF JAL SHAKTI
DEPARTMENT OF WATER RESOURCES, RIVER DEVELOPMENT & GANGA REJUVENATION

REPORT ON

Dynamic Ground Water Resources of Andaman & Nicobar Islands
(As on 31.03.2022)



Prepared by

CENTRAL GROUNDWATER BOARD
Eastern Region, Kolkata

Andaman Public Works Department
Port Blair, Andaman & Nicobar Islands

December' 2022

PREFACE

The Andaman & Nicobar Islands comprises of arc-shaped chain of islands in the Bay of Bengal. They are characterized by undulating rugged topography, steep slope, low infiltration capacity and close proximity of hills to the sea. Entire chain of islands are occupied by varied rock types like marine sedimentary rocks, extrusive and intrusive igneous rocks and coralline limestone. Marine sedimentary rocks cover about 70% area of the total geographical area of islands. The igneous and sedimentary groups of rocks which cover the rest of the geographical area are fractured and fissured because of their active seismo-tectonic nature.

As per 2011 Census, out of 572 islands present in the Andaman and Nicobar group of islands in the Union Territory of Andaman & Nicobar Islands, about 29 are inhabited. The islands receive on an average 3000 mm rainfall per annum, but steeper slopes do not facilitate adequate recharge to the sub-surface aquifer(s).

In rural areas of Andaman group of Islands & Great Nicobar Island springs are dependable source of drinking water, while in Neil, Havelock, Long island, Little Andaman islands in Andaman group and in major parts of Nicobar group of islands, water supply is catered through dug wells. Although the major rock formation i.e. the sedimentary rock formation possesses fractures, but they do not form potential aquifers both in shallow and deeper horizons due to their non-pervasive nature, preponderance of clayey minerals often resulting in clogging of fractures. Dug wells constructed in the weathered horizons have meager yields. In the valley areas, dug wells are constructed which are used as a supplementary sources of drinking water in the rural areas of Andaman group of islands. The water supply to Port Blair city is met from the Dhanikhari Dam whose supply is often shattered with the recession of the monsoon rainfall. The scattered dug wells in the city often play a vital role to overcome the severe water crisis. These sources of ground water are becoming polluted by the anthropogenic activities. The loss in surface area in some of the highly earthquake devastated islands during 26th December 2004 have made possible changes in freshwater volume in the islands.

Scientific utilization of groundwater in this Island territory needs periodic assessment of ground water resources, to manage changing demography, irrigation use and emerging tourism sector. This also warrants an evaluation of the availability, demand and projected demand scenarios of ground water in the islands. However, ground water being at the state of constant flow, assessment procedure becomes highly complicated involving several variables, which are not possible to measure directly. Nevertheless, the effort towards estimation of ground water resources is also to obtain a synoptic view of the existing status of ground water scenario of the A&N islands, which is pivotal for formulation of developmental strategies and proper planning.

As per the present assessment(As on 31.03.2022, the total Annual Ground Water Recharge of the A&N Islands have been assessed as 0.6184 bcm and Annual Extractable Ground Water Recharge is assessed as 0.5566 bcm. The Annual Ground Water extraction is 0.0075 bcm which translates to a Stage of Ground Water Extraction of 1.35 %. Out of 37 assessment units (Islands), one (01) is Hilly, thirty-five (35) are 'Safe' and one (01) is 'Saline'. There is no significant change with respect to 2020 assessment. The figures have been duly ratified, approved and adopted by the State Level Committee(SLC) via Online Meeting, held on 30.08.2022.

This report is the outcome of the efforts made by Shri Anirvan Choudhury, Scientist-'C'(Hydrogeology), Dr. Indranil Roy, Scientist-'D'(Hydrogeology), Shri Awadhesh Kumar, STA(HG), and Dr Nilamoni Barman, Scientist-'B'(Hydrometeorology), Central Ground Water Board, Eastern Region, towards assessment of dynamic component of ground water resources available in the unconfined aquifers of the Island territory of this U/T, with generous technical contribution, co-operation and timely inputs from APWD, Andaman & Nicobar Administration.

Place : Kolkata
Date : 13.12.2022

अ. गायेन 13/12/2022

(Dr. Anadi Gayen)
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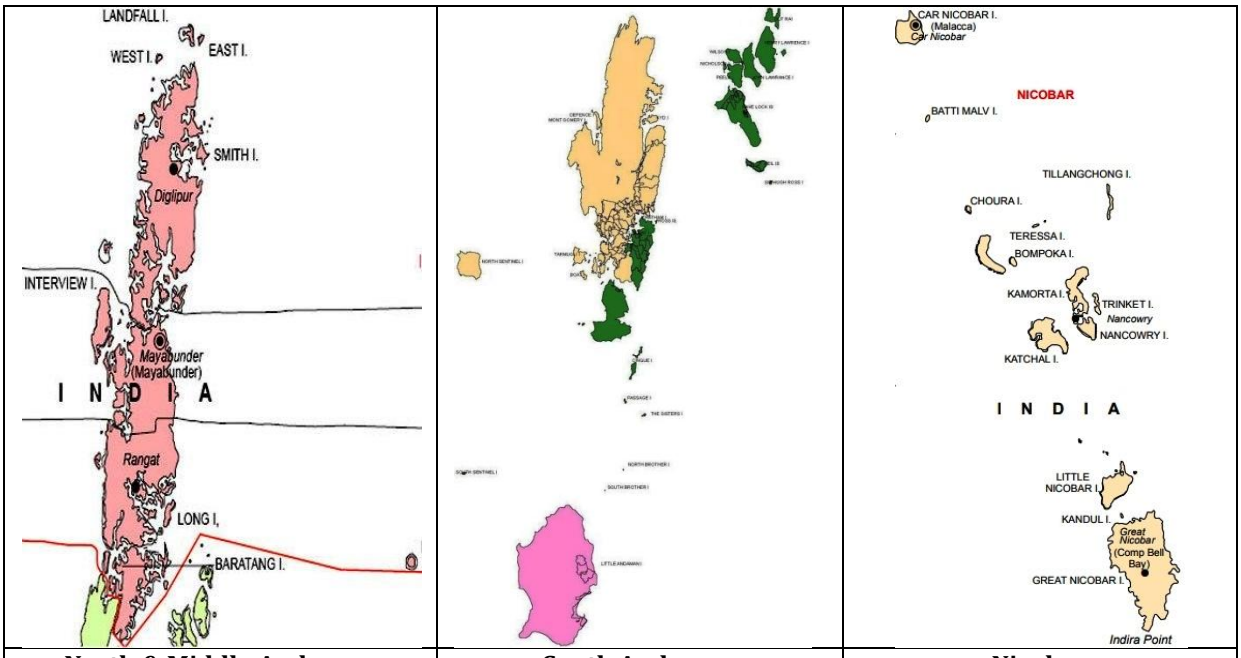
1. INTRODUCTION

1.1 Background for estimating the total ground water resources of the Union Territory

The Union Territory of Andaman and Nicobar Islands forms North - South trending archipelago in the far flung maritime areas of Bay of Bengal. It lies between the North Latitudes of 6° and 14° East Longitudes of 92° and 94°, covering an approximate geographical area of 8,249 sq. km. There are three (3) Districts comprising nine (9) Blocks/Tehsils. The islands form two major groups, popularly known as Andaman Group or Northern Group of Islands which constitutes Andaman District where as the other group is called Nicobar or Southern Group of Islands constitute the Nicobar District. Andaman and Nicobar Group of Islands constitute this Union Territory(Figure–1.1). As per 2011 census the population of Andaman & Nicobar Island is 3,80,591.



North & Middle Andaman District	South Andaman District	Nicobar District

Figure–1.1: Administrative map showing District wise major islands of Andaman and Nicobar Islands

The Andaman & Nicobar Islands comprises of arc-shaped chain of islands in the Bay of Bengal. They are characterized by undulating rugged topography, steep slope, low infiltration capacity and close proximity of hills to the sea. Entire chains of islands are occupied by varied rock types like marine sedimentary rocks, extrusive and intrusive igneous rocks and coralline limestone. Marine sedimentary rocks cover about 70% area

of the total geographical area of islands. The igneous and sedimentary groups of rocks which cover the rest of the geographical area are fractured and fissured because of their active seismo-tectonic nature.

As per 2011 Census, out of 572 islands present in the Andaman and Nicobar group of islands in the Union Territory of Andaman & Nicobar Islands, about 29 are inhabited. The islands receive on an average around 3000 mm rainfall per annum, but steeper slopes do not facilitate adequate recharge to the sub-surface aquifer(s).

In rural areas of Andaman group of Islands & Great Nicobar Island springs are dependable source of drinking water, while in Neil, Havelock, Long island, Little Andaman islands in Andaman group and in major parts of Nicobar group of islands, water supply is catered through dug wells. Although the major rock formation i.e. the sedimentary rock formation possesses fractures, but they do not form potential aquifers both in shallow and deeper horizons due to their non-pervasive nature, preponderance of clayey minerals often resulting in clogging of fractures. Dug wells constructed in the weathered horizons have meager yields. In the valley areas, dug wells are constructed which are used as a supplementary sources of drinking water in the rural areas of Andaman group of islands. The water supply to Port Blair city is met from the Dhanikhari Dam whose supply is often shattered with the recession of the monsoon rainfall. The scattered dug wells in the city often play a vital role to overcome the severe water crisis.

With passage of time - these sources of ground water are becoming polluted by the anthropogenic activities. The loss in surface area in some of the highly earthquake devastated islands during 26th December 2004 have made possible changes in freshwater volume in the islands.

Scientific utilization of groundwater in this Island territory needs periodic assessment of ground water resources, to manage changing demography, irrigation use and emerging tourism sector. This also warrants an evaluation of the availability, demand and projected demand scenarios of ground water in the islands. However, ground water being at the state of constant flow, assessment procedure becomes highly complicated

involving several variables, which are not possible to measure directly. Nevertheless, the effort towards estimation of ground water resources is also to obtain a synoptic view of the existing status of ground water scenario of the A&N islands, which is pivotal for formulation of developmental strategies and proper planning.

Administrative Base map showing major islands of Andaman and Nicobar group of islands is shown in Figure-1.1 and Administrative set-up of Andaman and Nicobar Islands is depicted in Table-1.1.

Table-1.1: Administrative set-up of Andaman and Nicobar Islands

District	Name of Block/Tehsil	Islands
North and Middle Andaman	Mayabunder	North Andaman (Mayabunder Tehsil) Stewart Island Aves Island Interview Island
	Rangat	Middle Andaman North Passage Island Long Island Porlob Island Baratang Island Strait Island
	Diglipur	Peel island Narcondam Island East Island North Andaman (Diglipur Tehsil) Smith Island
South Andaman	Port Blair	Havelock Island John Lawrence Island Neil Island South Andaman (Port Blair Tehsil) Rutland Island North Sentinel Island Little Andaman Island
	Ferrargunj	South Andaman (Ferrarganj Tehsil) Flat Bay Island Viper Island
Nicobar	Car Nicobar	Car Nicobar
	Nancowry	Chowra Tillangchang Teressa Bampooka Katchal Kamorta Nancowry Trinket Little Nicobar Kondul Pulo Milo Great Nicobar

1.2 Constitution of state-level committee for ground water resources estimation as on 31st March 2022

By considering similarity of purpose, the Andaman and Nicobar Administration is of view to continue with earlier committee formed for dynamic water assessment 2017 & 2020 vide order No. 3462, dated 09.11.2018, in connection with reassessment of Dynamic Ground Water Resource 2020 as desired by Ministry of water Resources, River Development & Ganga Rejuvenation, Central Ground Water Board vide Letter No. 29-20/2018-PWD/1266, dated 03.12.2020. In addition to this, it was decided that henceforth, this committee will act as regular State Level Committee(SLC) for all future periodic re-assessment of Ground Water Resources in Andaman & Nicobar Islands. This was communicated by Andaman Nicobar State Water and Sanitation Mission of APWD vide their Letter No. 1-20/ANSWSM/CGWB/2021-22/402 Dated 18.02.2022. The composition of the Committee is as under:

1.	Principal Secretary (PWD)	-	Chairman
2.	Secretary (Department of Science & Technology)	-	Member
3.	Chief Engineer, APWD	-	Member
4.	Superintending Hydrogeologist, CGWB	-	Member
5.	Director (Agriculture)	-	Member
6.	Director (Industries)	-	Member
7.	Director (ANSWSM), CE's Office, APWD	-	Member
8.	Representative from NABARD	-	Member
9.	Regional Director, CGWB	-	Member Secretary

CHARTER

- Under the directive of MoWR, Dynamic groundwater (GW) resource assessment of entire country has been continuing following Groundwater Estimation Committee (GEC) norm-1997.
- The assessment is done by CGWB, the apex GW organization in MoWR in liaison with the concerned State/UT Govt./Administration where Ground Water Research and Development Department is existing.
- The GEC-1997 had continued till 2013 for groundwater resource assessment for the entire country.
- The GEC-1997 norm has been modified in 2015 as per the directive of MoWR and regarding the GW Resources assessment as per GEC-2015, MoWR has directed CGWB to approach all state/UT Govt. to assess the GW resources for 2017, 2020 & 2022.

- Since rainfall is the prime source of recharge to GW and the rainfall for the entire year of 2020-2022 is available, the GEC committee has recommended to DoWR, RD & GR, MoJS, GoI, to assess it for a calendar year 2021-2022 ending in31.03.2022.
- In A & N Islands, the resource is calculated by CGWB in the absence of R & D Department on GW in A & N Administration. CGWB renders all needful help in matter of Water Resource Development and Management, particularly GW to A & N Administration. APWD acts as the Nodal Agency of the U/T in matters of Ground Water.
- Since ground water is a scarce commodity in A & N Islands, as also in view of extreme population pressure on the Islands due to tourism boom, CGWB, Govt. of India has recommended GW Resource estimation in A & N Islands at a regular interval as in other parts of India.
- DoWR, RD & GR, MoJS, GoI had earlier desired to calculate the GW Resources of the entire country including A & N Islands.
- As per this norm, the State/UT-wise Dynamic Groundwater Resources are being estimated at regular interval.
- The basic groundwater resource assessment unit is an Administrative block. In some cases i.e. in few north-eastern states, where block boundaries are not defined, the assessment is done as per watershed basis.
- In A & N Islands, it is done island-wise for the inhabited islands.
- The GW Resources of A & N Islands, being assessed, need to be put forward before a committee for their understanding it as also to know the status of GW Resource development in various inhabited Island.
- In A & N Islands, APWD is the nodal Stake holder Department beside others. Accordingly the name and head of various stake holder departments are proposed for constitution of a committee with the approval of the competent authority in A & N Administration.
- In view of above the task was given by DoWR, RD & GR, MoJS, GoI to CGWB for the needful.
- A & N Island falls under the jurisdiction of CGWB, Eastern Region, Kolkata. And in consultation with APWD the calculation of Dynamic Groundwater Resources of A & N Islands(As on 31.03.2022) was completed and placed before the empowered SLC on 30.08.2022, wherein it was unanimously approved and adopted.

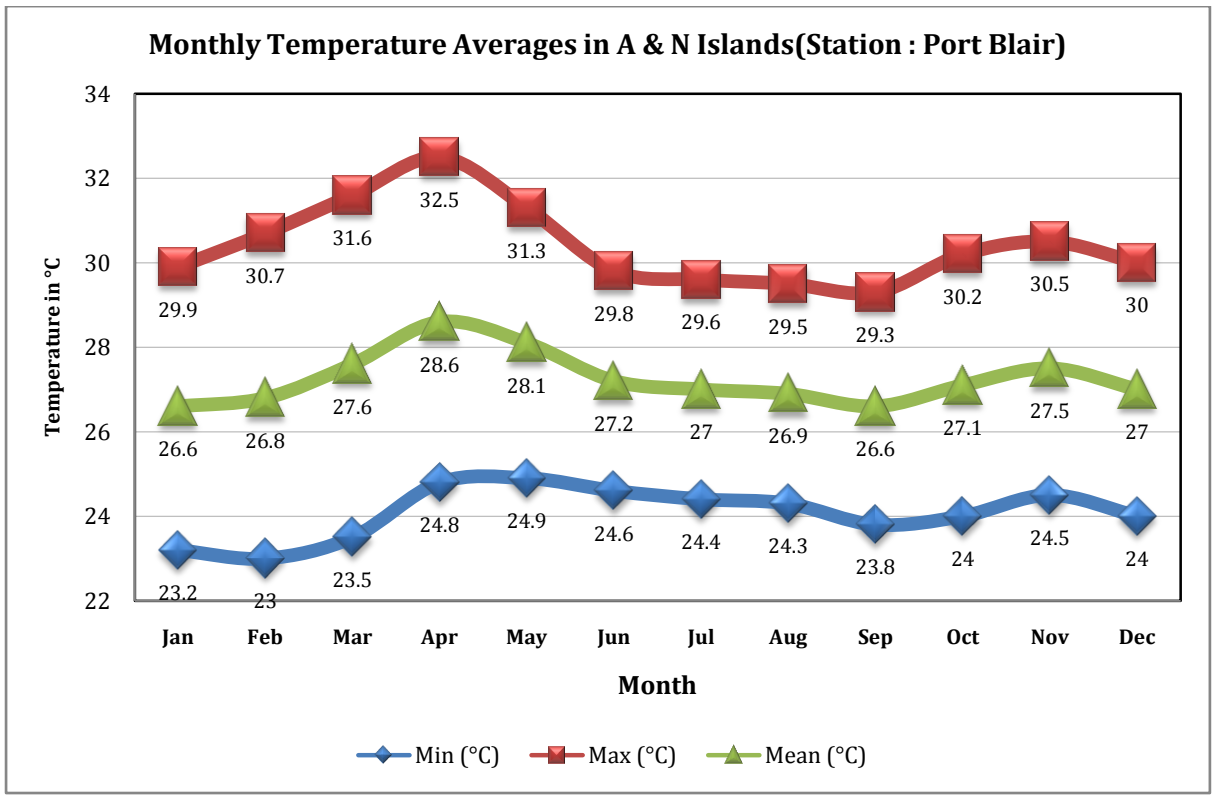
The final report on Dynamic Ground Water Resources of A & N Islands as on 31st March 2022 is prepared by considering suggestions provided by the expert committee. The major propose are as follows:

- Ground water draft per person per day as per APWD - 55 lit
- Non-monsoon recharge by ponds - 60 days out of 125 days of non-monsoon period.

2. HYDROGEOLOGICAL SETUP

2.1 Climate

Andaman Islands enjoy typical tropical climate all through the year. With an average temperature of around 23°C (minimum) and not exceeding 30°C (maximum), Andaman Islands are hot and humid generally. Relative humidity ranges from 79% to 89%, average wind speed is 7 to 10 km/hr, maximum temperature varies between 27° to 33°C and minimum temperature fluctuates between 21° to 25° C. Evaporation rate is very high, i.e. 1500-1800 mm/year because of the location of the archipelago close to the equator i.e. 6°N to 14°N. The high humidity levels are tempered by the sea breeze that springs up making the climate pleasant throughout the day, more so especially in the evenings. In spite of copious rainfall, the islands face acute scarcity of fresh water especially in the years of recession of monsoon.

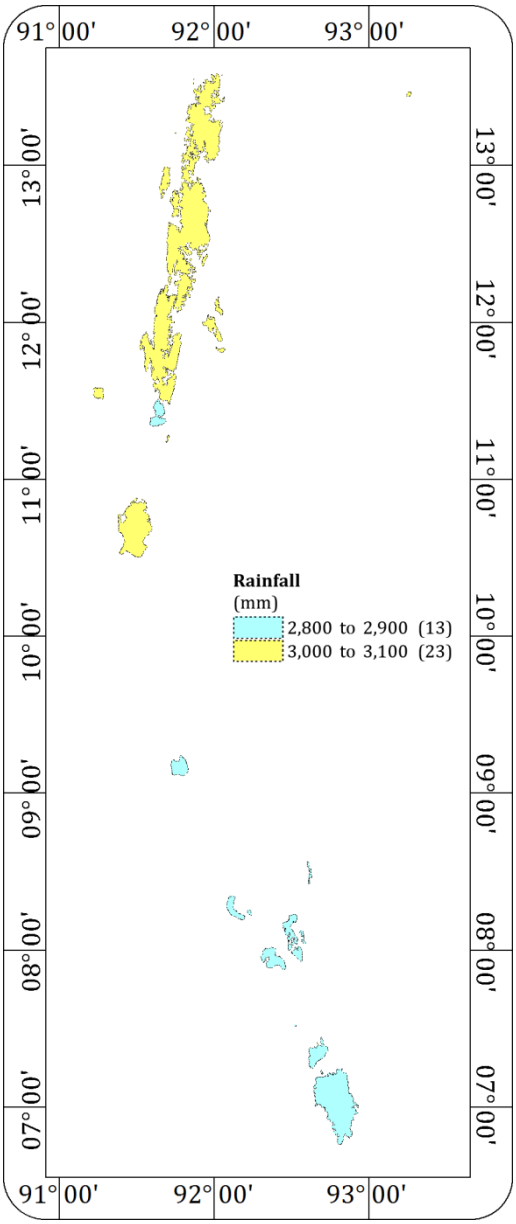


Figure–2 .1 : Monthly average temperatures in Andaman & Nicobar Islands

2.2 Rainfall

In the current decade the rainfall distribution has become highly whimsical and dwindling. Prior to 1990 the rainfall used to commence from 1st week of May every year while now it is receded to 1st week of June as happened in 2001, 2002 and 2003. In 2004 the rainfall in Andaman District has been close to normal. However, the Tsunami devastated Southern Group of Islands are not receiving appreciable rainfall. The annual rainfall of Andaman and Nicobar Islands in

year 2021 is 2954.43 mm. Since the islands are isolated, having wide variation in rainfall, hence preparation of iso-hyetal map is not feasible. The assessment unit wise normal annual rainfall zonation map is shown in Figure-2.2 below :



Figure–2.2 : Normal Annual Rainfall Zonation Map of A & N Islands

2.3 Physiography & Drainage

More than 300 islands make up the Andamans. North, Middle, and South Andaman, known collectively as Great Andaman, are the main islands; others include Landfall Island, Interview Island, the Sentinel Islands (where the Sentinelese tribes live), Ritchie's Archipelago, and Rutland Island. The 10-degree channel which is about 145 km long separates Little Andaman in the south from the Nicobar Islands.

The Nicobars consists of 19 islands. Among the most prominent is Car Nicobar in the north; Camorta, Katchall, and Nancowry in the centre of the chain; and Great Nicobar in the south. About 90 miles to the southwest of Great Nicobar lies the north-western tip of Sumatra, Indonesia.

Both the Andaman and Nicobar groups are formed by the above-sea extensions of submarine ridges of mountains and are a part of a great island arc. The highest peak is 2,418 feet at Saddle Peak on North Andaman, followed by Mount Thullier at 2,106 feet on Great Nicobar and Mount Harriet at 1,197 feet on South Andaman. Barren island, the only known active Volcano in south Asia lies in the Andaman sea. In the late 20th and early 21st centuries, there were volcanic eruptions on Barren Island.

Terrain of the Union Territory is rough, with hills and narrow longitudinal valleys. Flat land is scarce and is confined to a few valleys, such as the Betapur on Middle Andaman and Diglipur on North Andaman.

The terrain of the Nicobar is more diverse than that of the Andamans. Some of the Nicobar Islands, such as Car Nicobar, have flat coral-covered surfaces with offshore coral formations that prevent most ships from anchoring. Other islands, such as Great Nicobar, are hilly and contain numerous fast-flowing streams. Great Nicobar is the only island in the territory with a significant amount of fresh surface water.

Perennial streams of the status of major rivers are absent in the Andaman and Nicobar group of Islands. The major Perennial streams in South Andaman district are Dhanikhari, Mithakhari, Burmanala, Premanala, Prothrapurnala, Kamsarat Nala, Sona Phar nala etc. In North-Middle Andaman district Kalpong Nala, Korang nala, Betapur nala, Rangat nala, Sankar Nala etc are the important perennial streams. In Nicobar District, Galathea and Alexandria rivers, Dhillon Nala, Magar Nala all in Great Nicobar island are the main drainage channels. Streams are rudimentary in Car Nicobar island while in Chowra, Kondul and Pillow Millo islands the drainage channels are obscured. However, incipient to moderately developed drainage channels are available in Little Nicobar and in all the other islands of Nancowrie group.

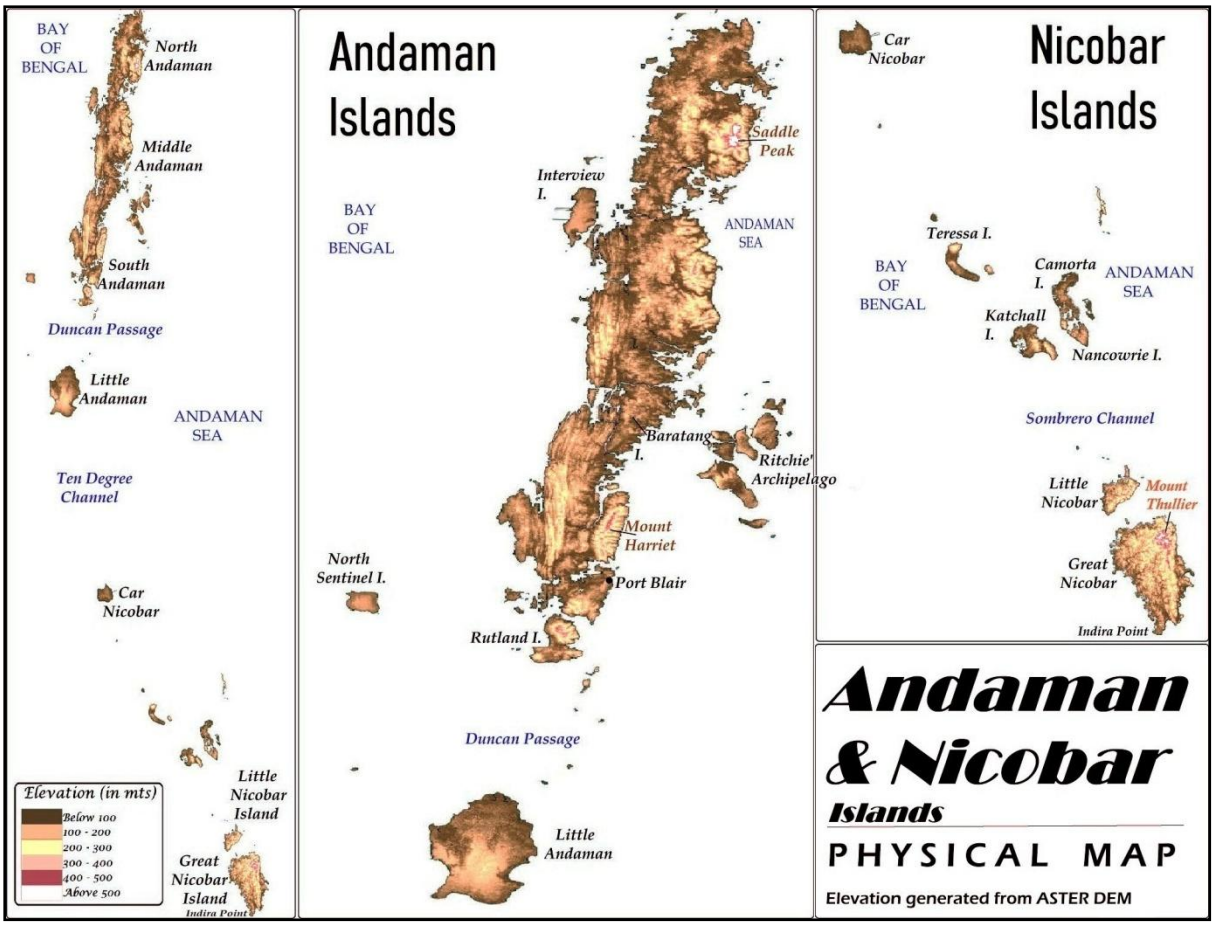


Figure-2.3 : Physiographic map of Andaman & Nicobar Islands

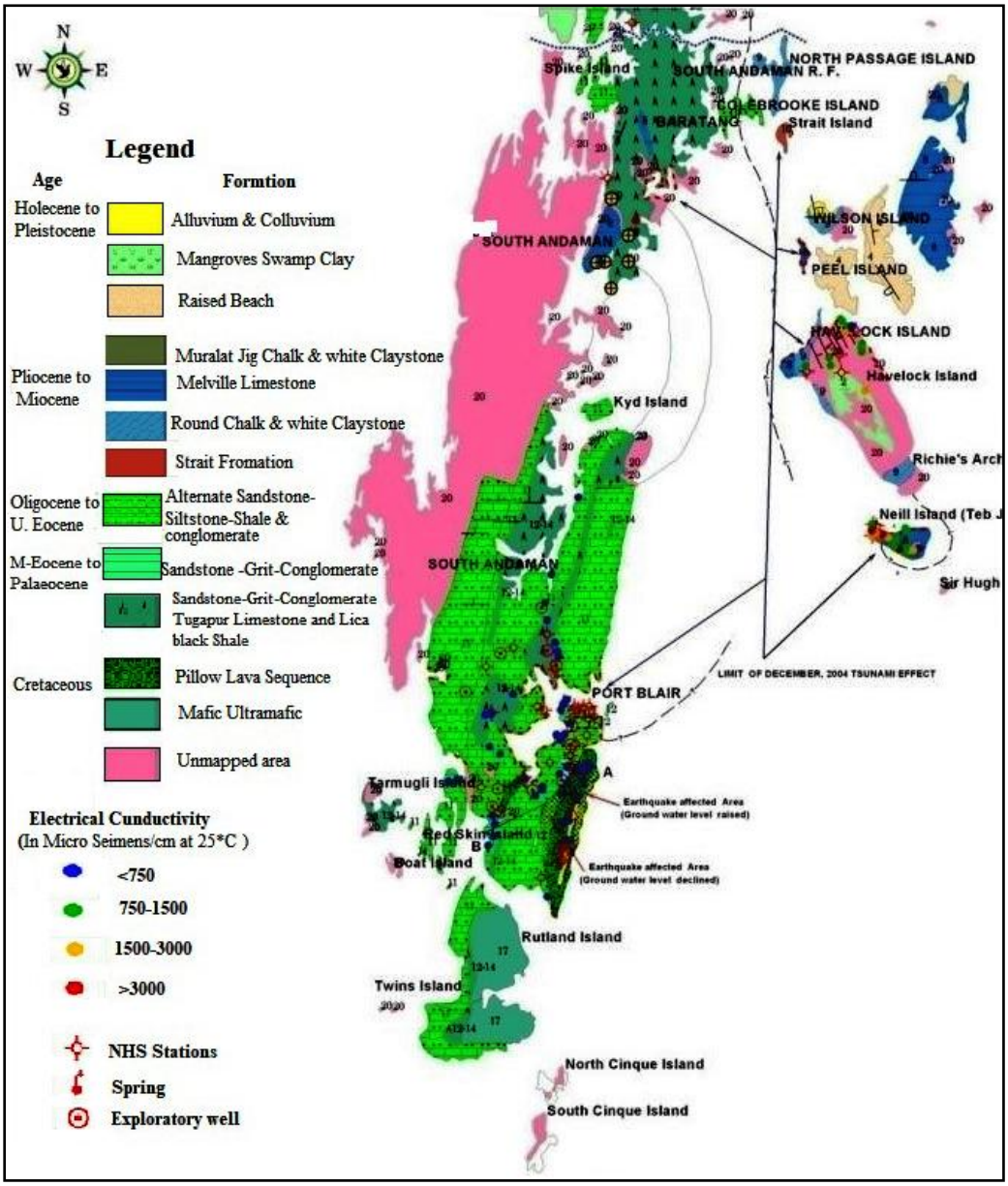
2.4 Geology

Geologically marine sedimentary group of rocks comprising shale, sandstone, grit and conglomerate; extrusive and intrusive igneous rocks (volcanic and ultramafic) and coralline atolls and limestone occupy the entire geographical area. Amongst these, the sedimentary origin formations are most pervasive and occupies nearly 70% of the geographical area of the islands while the igneous origin formations covers nearly 15% while the rest 15% goes to the coralline and limestone formations. All these rock formations have been subjected to chain of tectonically active zone, evident from the occurrence of shallow and deep focus earthquakes in the islands. Because of tectonic activity, the Igneous and Sedimentary group of rocks are highly fractured and fissured. These fracturing in hard rock form conduits for movement of ground water in the deeper horizon. The geology of the islands is highly varied within a small distance.

Late Cretaceous igneous rocks, the ophiolite suite, marine sedimentary rocks of Paleocene to Oligocene age and Recent to Sub-Recent beach sand, mangrove clay, alluvium and coral rags are predominant in the area. The Ophiolite suite of rocks comprises of a wide variety of acidic to

ultrabasic plutonic rocks and their equivalent basic volcanic rocks occur in sporadic patches in both Andaman and Nicobar Group of Islands.

Other rock types, white clay beds and raised coralline limestone are of late Pliocene to Pleistocene age. The rocks of this group are generally rendered good aquifers due to krastification. The ophiolite and marine sedimentaries have undergone different phases of folding, faulting. The area is considered to be orogenically active even today. The generalized geological map is shown in Figure-2.4 and the geological succession of Andaman and Nicobar Islands is given in Table-2.1 .



Figure–2.4 : Geological map of Andaman & Nicobar Islands

Table-2.1: Generalized Geological Succession of Andaman & Nicobar Islands

Age	Group	Formation
Recent to sub-Recent	Quaternary Holocene Group	Beach sands, Mangrove clay, Alluvium, Coral rags and Shell limestone, loosely consolidated pebble beds
~~	**Unconformity**	~~~~~~~~~~~~~~~~
Pleistocene to Late Pliocene	Nicobar Group	Shell limestone, Sandstone, Claystone, etc.
Miocene	Archipelago Group (Upper)	White claystone, Melville Limestone
~~	**Unconformity**	~~~~~~~~~~~~~~~~
Oligocene to Paleocene	Andaman Flysh , Mithakhari Group	Thinly bedded alternations of Sandstones and siltstones, grit, conglomerate, Limestones, black Shales with olistiliths.
~~	**Unconformity**	~~~~~~~~~~~~~~~~
Late Cretaceous	Ophiolite Group	Dyke swarms, acidic suite,Pillow lava with radiolarian chert and ultramafic suite.

2.5 Hydrogeology

Hydro-geologically, there are three major formations in the Andaman and Nicobar Group of Islands:

a) Porous formation consist of beach sand with coral rags and shale,

b) Thin cover of alluvium in the valleys and foot hills adjacent to valleys

c) Moderately thick pebbly valley fill deposits (colluvium) in the narrow inter-montane valley constitute the water table aquifer.

The thickness of beach sand and alluvial deposits ranges between 3 to 6 m. and sometimes ranges up to 9 m. In Great Nicobar the thickness is thinner, only 2 to 2.5 m. The colluvial deposits in narrow inter-montane valley e.g., Beadnabad valley have much higher potentiality. One bore well of 152 mm diameter was drilled by CGWB down to 16.50 mbgl tapping the total thickness of the saturated colluvial deposits and yielded 72 m^3/hr. and pumping for 500 minutes did not show any deterioration in chemical quality. The drawdown was recorded as 5.67 m and Transmissivity was calculated as 127m^2/day. The well could cater to the domestic need of 10000 rural populations.

The fissured formation consists of the Upper Cretaceous Ophiolite Suite of rocks including the basic volcanics, the ultrabasic and intermediate to acid plutonic rocks. Based on the compactness and fracturing of these rocks as revealed by exploratory drilling carried out in parts of the island the rocks are again classified as consolidated group and semi consolidated group. The fractured upper Cretaceous igneous rocks and the Lower Tertiary conglomerate, grits, graded sandstone (greywacke) and their weathered upper mantle form the aquifers, the

weathered mantle is seldom 3 to 4 m thick but adjacent to the valleys it is about 6 m. The saturated thickness of the weathered mantle and the immediately underlying shallow fracture zones form the water table aquifer. Deeper fracture zones within 60 m below ground level form semi-confined to confined aquifer. The generalized geological succession of Andaman & Nicobar Islands has been given in Table-2.1 and Geology and Hydro-geological map of the islands is shown in Figure–2.5.

The fractured volcanic rocks at places e.g. Brichganj, Hamfreganj are not productive as the yield of the tube wells were in the order of 1.18 m^3/hr and 0.52 m^3/hr respectively. It appears that the fractured volcanic rocks are most productive where they are intruded by the ultrabasics. The area covered by the fractured sedimentary rocks, 13 exploratory bore holes were drilled and 2 bore holes were found successful i.e. at Potheropore and Dithaman Tank. At both the places Mithakari Sandstones and Shales were encountered, the productive fracture zones at Prothrapore between 25 to 60 meter, but yielded 17 m^3/hr water which is brackish. The borehole at Dilthaman Tank yielded very less but EC value was less and water potable. The boreholes drilled at other places in the sedimentary rocks through dark grey shale of Mithakari Group were found dry.

It is apparent from the study that the weathered sandstone are poor aquifers whereas the weathered volcanic rocks act as moderate to good aquifers at suitable locales. Results of 18 exploratory bore wells in South Andaman show that the deeper fractures imparting secondary porosity and permeability are restricted within 60 m bgl in sedimentary rocks and within 52.7 m in the volcanic and the intermediate plutonic rocks. The most productive fracture zones are in the volcanic rocks as noticed at Calicut in the depth range of 14-20 m, and 45-52 m where an intrusion of ultrabasic rock (Serpentinites) was noticed. The yield of the bore well was recorded as 44.67 m^3/hr, draw down after 500 minutes of pumping was 8.23 m, Transmissivity was calculated and found to be 39.6 m^2/day.

The area covered by semi consolidated Lower Tertiary sedimentary rocks in the Great Nicobar Island were also explored and found the thin bedded fine grained sand stone – clay stone alternation cannot be properly termed as aquifers. The maximum discharge obtained by tapping 31 m thick fine grained, soft argillaceous sand stone within 20 - 92 m bgl, was 187 litres/hr and quality of water was found good. Better discharge has been found in the same Island, but the quality of water was brackish (EC : 4503 µS/cm at 25° C).

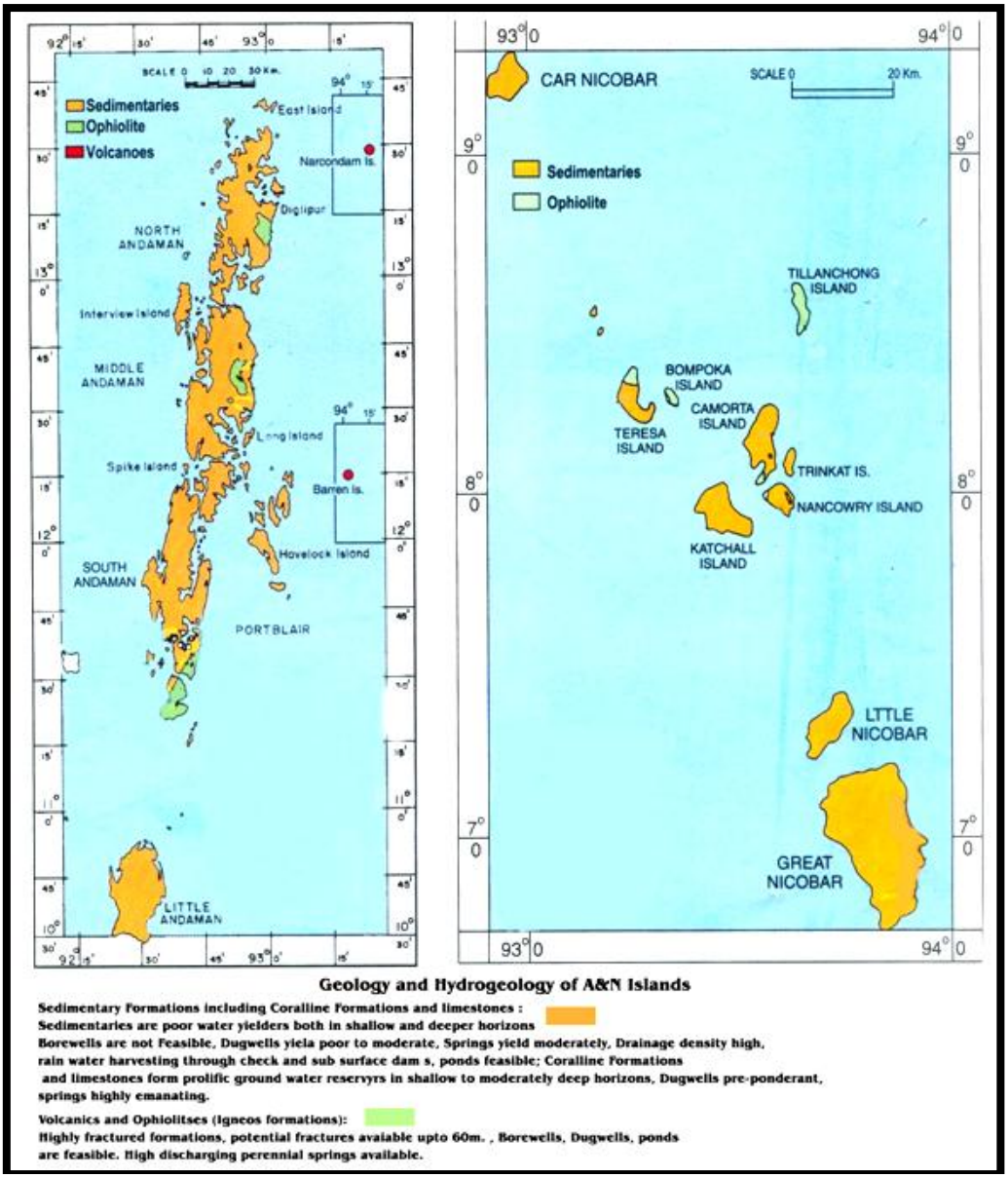
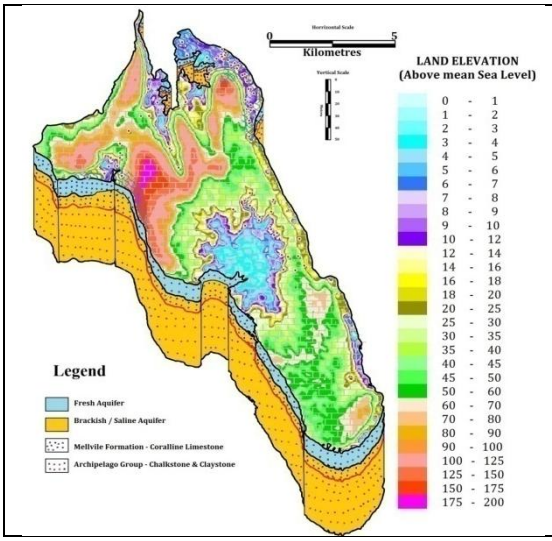
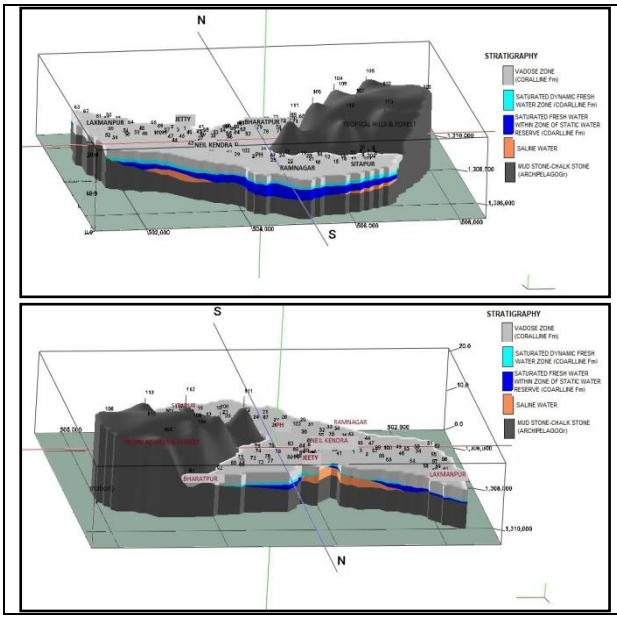


Figure – 2.5: Geology and Hydrogeology of Andaman & Nicobar Islands



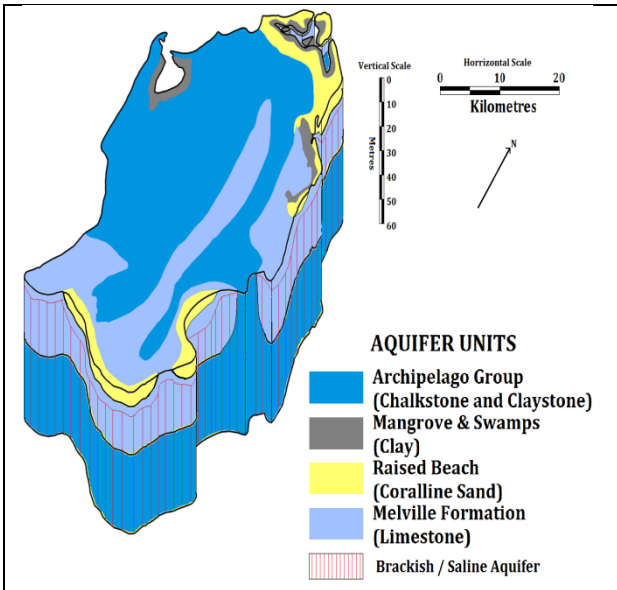
- Two aquifer groups occur down to the depth of 60mbgl.
- **Shallow aquifer (A1):** occurs up to depth of 30 mbgl; Yield potential: 5-25 lps.
- **Deeper aquifer (A2):** occurs in the depth span of 45-60 mbgl; Yield potential: Negligible – 12 lps

Figure 2.6 : Aquifer Disposition in Havelock Island



- Two aquifer groups occur down to the depth of 60mbgl.
- **Shallow aquifer (A1):** occurs up to depth of 30 mbgl; 3 Sub-Aquifers, Middle Aquifer is Fresh and sandwiched between top and bottom Saline Aquifers. Yield potential: 5-10 lps.
- **Deeper aquifer (A2):** occurs in the depth span of 30-60 mbgl; Yield potential: Negligible – 5 lps; Hardly explored

Figure - 2.7: Aquifer disposition in Neil Island



- Only Eastern part Explored in details
- Two aquifer groups occur down to the depth of 60mbgl.
- **Shallow aquifer (A1):** occurs up to depth of 25 mbgl; 2 Sub-Aquifers, Middle Aquifer is Fresh overlain by thin top Saline Aquifers. Yield potential: 5-15 lps.
- **Deeper aquifer (A2):** occurs in the depth span of 30-60 mbgl; Yield potential: Negligible - Hardly explored
- Fractures and cavernous Limestones have been detected in Geophysical surveys upto 120mbgl

Figure - 2.8: Aquifer disposition in Little Andaman Island

2.6 Ground water level conditions – water level, fluctuation, trend

In sedimentary rock in valleys and adjacent to Bays, depth of dug wells are generally restricted to 3.5 to 4 m bgl, depth to water level in the dug wells in valleys 2.5 to 2.75 m, and in the igneous rock in same physiographic unit depth to water level generally less than 3 mbgl, with a seasonal fluctuation around 1.5 to 2.5 m. Sp. Capacity of lower Tertiary Sandstone, was found very low in

the range of 1.12 to 2.61 lpm/m, in the weathered volcanic rock sp. Capacity values was in the order of 0.79 and 9.55 lpm/m.

During pre-monsoon in 2021, minimum water level 0.38 mbgl at Port Blair in South Andaman and maximum of 14.12 mbgl at Bednabad (Tube-well) in South Andaman have been recorded; during post-monsoon 2021, maximum water level of 9.10 mbgl at Calicut in South Andaman and a minimum of 0.44 mbgl in Knoppuram also in South Andaman have been recorded. Average depth to water level in respective islands is as follows:

Table 2.2: Average depth to water level in different islands

Islands	South Andaman	Middle Andaman	North Andaman	Long Island	Havelock Island	Neil Island
Pre-monsoon 2021	2.42	1.57	2.04	2.28	2.61	4.68
Post-monsoon 2021	1.41	0.85	0.51	0.74	1.90	3.70
Fluctuation 2021	1.02	0.72	1.53	1.54	0.71	0.98

In order to study the behaviour of ground water regime with time and space in Andaman & Nicobar Islands, 112 Hydrograph Monitoring Stations were established in seven islands, viz. South Andaman, North Andaman, Middle Andaman, Long Island, Havelock Island and Neil Island. Periodic water level measurements are being taken 2 times in the year, for pre-monsoon period during May and for the post-monsoon period during December.

2.7 Ground water quality

The quality of ground water throughout the island is neutral to alkaline as envisaged from the analytical results of water samples collected from the existing monitoring stations and reference wells (all dug wells). It is generally of the calcium bicarbonate type, and the bicarbonate content varies from 91 to 427 ppm greatly predominates over the chloride content varying between 14-202 ppm. Computation of the chloride-bicarbonate ratio of ground water from the islands show that the ratio varies between 0.1 to 0.2 which indicates that there has been no large scale saline water intrusion at any place in the islands. In general the ground water is fresh with low mineralization having Electrical Conductivity (EC) ranging from 292 to 1120 μS /cm at 25° C, baring a few cases eg.1340 μS/cm at 25° C at Marina Park, (South Andaman) and at Sitanagar, (North Andaman), > 200 μS /cm at Saitankhari (South Andaman). Iron concentration in ground water are mostly within the permissible limit, except Namunanagar (1.36 ppm), Light House (2.15 ppm), at Annicut (2.59 ppm). As the islands are located in scattered manner, preparation of EC map is not logical in this hydro-geological set up.

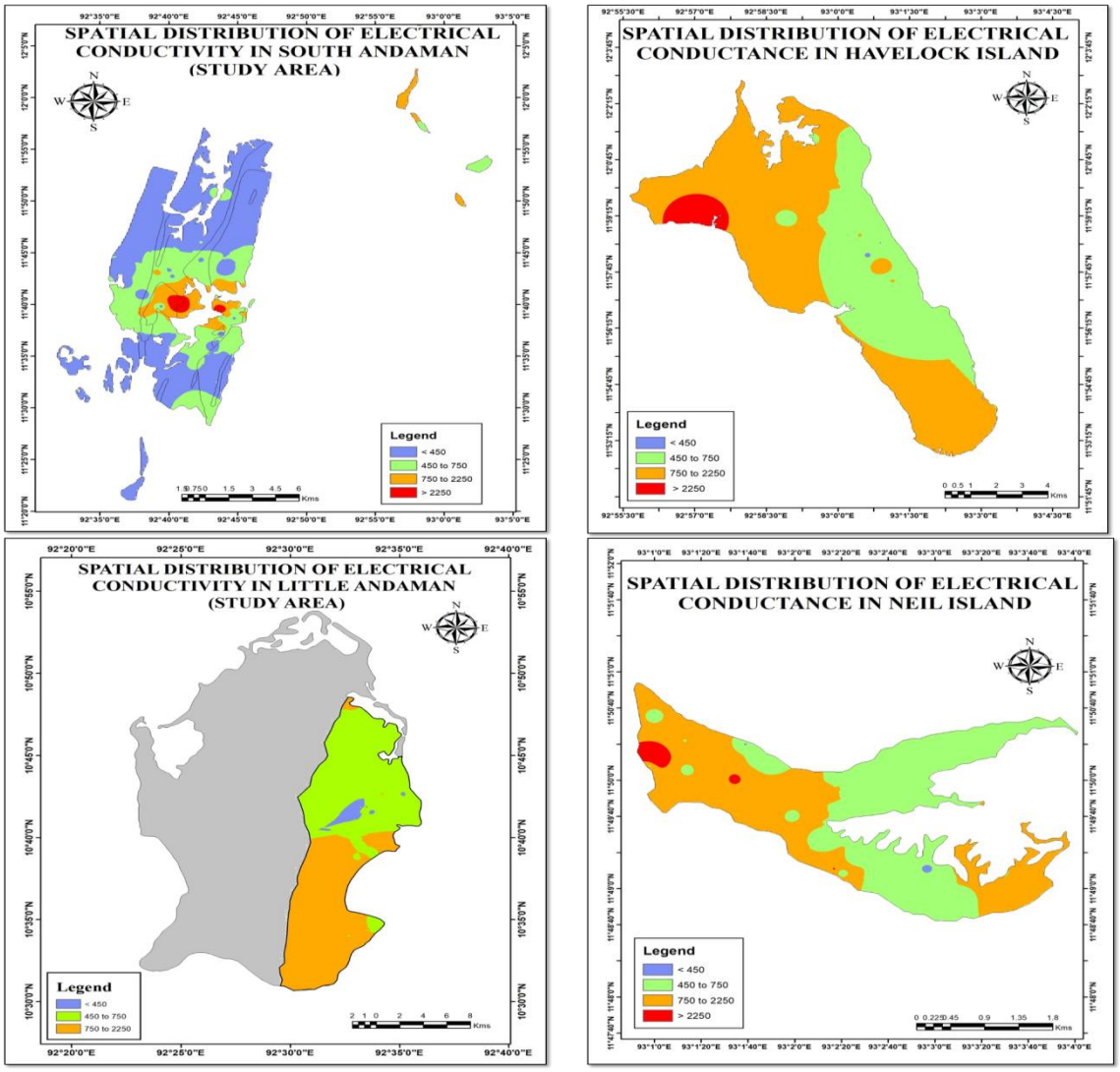


Figure-2.9 : Spatial variation in Ground Water Quality in A & N Islands

3. METHODOLGY

3.1 Ground Water Resource Estimation Methodology – GEC' 2015 - brief description

In India, first attempt to estimate the ground water resources on scientific basis was made in 1979. A High Level Committee known as Ground Water Over Exploitation Committee was constituted by Agriculture Refinance and Development Corporation (ARDC). This committee had estimated GW resources of the country however recommended that the methodology should be revised with increasing availability of data to make it more scientific. Accordingly, the Ground Water Estimation Committee (1984) came up with a revised methodology based on water balance approach (GEC–1984) for assessment of ground water potential and evolved new norms. In 1997 further refined methodology of ground water resource estimation has been proposed (GEC-1997). In 2015 an analytical and more refined methodology of ground water resource estimation has been proposed (GEC-2015).

The methodologies adopted for computing ground water resources are generally based on the hydrological budget techniques. The hydrologic budget technique is a specialised form of water balance equation that requires quantification of the processes of inflow and outflow from a ground water reservoir, as well as of changes in storage. A few of these parameters are directly measurable; some may be determined as a derivative of measured values or through some indirect methods of estimation.

3.2 Salient Points of GEC - 2015

Assessment Unit

Hard Rock – Watershed, as inflow/outflow across watershed boundaries is negligible.

Alluvial Areas – Administrative Block

Hilly areas having slope ≥ 20% are not considered; **in some islands huge area possesses slope ≥ 20%.**

Where the assessment unit is watershed, ground water assessment is converted in terms of an administrative unit by converting the volumetric resource into depth unit & then multiplying this depth with the corresponding area of the block.

Each unit is to be delineated into command & non-command areas. Ground Water assessment in command & non-command areas are done separately for monsoon and non-monsoon season. Mainly two approaches are adopted for this -

A) Ground Water(Water level) fluctuation method, which is based on is based on ground water balance equation i.e. (input-output = storage). For assessing this equation, various components are assessed separately for monsoon and non-monsoon seasons as well as separately for command and non-command areas using norms recommended by GEC 1997.

B) Rainfall infiltration method, recharge assessment is done only when data of sufficient duration is available. Overall components are computed separately for monsoon and non-monsoon seasons and for command and non-command areas.

In GEC-2015, the threshold limit of minimum and maximum rainfall event which can induce recharge to the aquifer is to be considered while estimating ground water recharge using rainfall infiltration factor method.

It is suggested that 10% of Normal annual rainfall may be taken as minimum rainfall threshold and 3000 mm as maximum rainfall limit. While computing the rainfall recharge, 10% of the normal annual rainfall is to be deducted from the monsoon rainfall and balance rainfall would be considered for computation of rainfall recharge.

The same recharge factor may be used for both monsoon and non-monsoon rainfall, with the condition that the recharge due to non-monsoon rainfall may be taken as zero, if the normal rainfall during the non-monsoon season is less than 10% of normal annual rainfall.

In using the method based on the specified norms, recharge due to both monsoon and non-monsoon rainfall may be estimated for normal rainfall, based on recent 30 to 50 years of data.

3.3 Basic Steps of Ground water Resource Assessment

- Demarcation of assessment units/sub-units: units - block (predominantly alluvial states), watershed (pre-dominantly hard rock states)/sub-units within assessment units-command, non-command, poor quality area;

- Computations of season-wise (monsoon & non-monsoon) gross ground water draft;

- Computations of season-wise (monsoon & non-monsoon) recharge from other sources – recharge from canal seepage, surface water and ground water irrigation, recharge from tanks & ponds, recharge from water conservation structures. Recharge from other sources is estimated using norms recommended;

In A & N Islands, ponds are mostly of same size: 30m*22m*3m

- Computation of season-wise (monsoon & non-monsoon) rainfall recharge

➢ Monsoon rainfall recharge: using two methods namely Water level fluctuation method and Rainfall Infiltration Method

➢ Non-monsoon rainfall recharge: using Rainfall Infiltration Method.

- Annual Replenishable Ground Water Resources: sum-total of Monsoon and non-Monsoon ground water recharge

- Allocation for Natural Ground Water Discharge during Non-Monsoon season:

5 -10% of Annual Replenishable Ground Water Resources; as Andaman & Nicobar Islands show high slope areas, therefore Natural Ground Water Discharge of 10% of Annual Replenishable Ground Water Resources has been considered.

- Net Annual Ground Water Availability: Annual Replenishable Ground Water Resources – Allocation for Natural Ground Water Discharge.
- Stage of Ground Water Development = $\frac{\text{Gross Annual Ground Water Draft}}{\text{Net Annual Ground Water Availability}}$
- Categorization of Assessment units based on - Stage of Ground Water Development and long term Water Level Trend as enumerated below

The categorization of Assessment Units is shown in Table-3.1.

Table-3.1: Categorization of Assessment units

Sl. No.	Stage of Ground Water Development (%)	Significant Long term Decline		Categorization
		Pre-monsoon	Post-monsoon	
1	≤ 70%	No	No	SAFE
		Yes/No	No/Yes	To be re-assessed
		Yes	Yes	To be re-assessed
2	> 70% and ≤ 90%	No	No	SAFE
		Yes/No	No/Yes	SEMI- CRITICAL
		Yes	Yes	To be re-assessed
3	> 90% and ≤ 100%	No	No	To be re-assessed
		Yes/No	No/Yes	SEMI-CRITICAL
		Yes	Yes	CRITICAL
4	> 100%	No	No	To be Re-assessed
		Yes/No	No/Yes	OVER- EXPLOITED
		Yes	Yes	OVER- EXPLOITED

Note:

- 'To be re-assessed' means that data is to be checked for the purpose of categorization.
- *The long term ground water level data should preferably be for the period of 10 years.*
- The significant rate of water level decline may be taken between 10 and 20 cm per year depending upon the local hydro-geological conditions.
- However, for all practical purpose, in contrast to GEC-1997 methodology, under GEC' 2015 Methodology, only the stage of ground water development will be taken into consideration for assigning categorization of assessment unit.

3.4 Procedure followed in the present assessment including assumptions and Computation of Ground Water Resources Estimation in Andaman and Nicobar Islands

- As per the GEC 2015 norm, the watershed or administrative unit could not be applied here since the islands are generally separated. For these reason respective Island wise water resources were calculated. Here Islands are forming the units. There are 36 Islands, which were previously dwelled by people. But, as per Census 2011, habitation has been encountered only in 29 islands. Therefore, the task of ground water resource estimation has been taken into consideration only in these 29 islands. As there is wide variation in lithology, rainfall infiltration also varies; so, the range of rainfall infiltration factor as utilized during the resources calculation varies from 0.04 to 0.22. Total Annual rainfall in Andaman and Nicobar Islands for the year 2021 is 3015.7 mm in North and Middle Andaman & South Andaman Districts, 2805.2 mm in Nicobar district.

- During calculation, the inter-montane valley and relatively flat topographical areas are considered as recharge areas. The hilly areas (573770 ha) having slope more than 20% are deducted from the geographical area available in the inhabited islands. The rechargeable area in the inhabited island is 211387 ha out of total geographical area of 785157 ha.

- Since water level data of all the Islands are not available, the rainfall infiltration method is adopted for computation of annual replenishable ground water resource. As Andaman and Nicobar Islands show high slopy areas, therefore, Natural Ground Water Discharge of 10% of Annual Replenishable Ground Water Resources has been considered.

- At present, all the ponds constructed by irrigation department are of similar size of 30m*22m*3m; also, in these islands rainfall takes place for about 8 months i.e. 240 days and the rest i.e. 125 days are non-rainfall days as suggested by APWD. For recharge by ponds, 1.44mm recharge by one hectare in one day has been considered.

- During meeting with the members of SGGWCC on **G W assessment as on 31st March 2020,** Director, ANDW&SM, A & N Islands opined that during non-monsoon period in A & N Islands ponds contain water for 60 days out of 125 non-monsoon days as said before and as per his suggestion, calculation of recharge by ponds in non-monsoon has been carried out accordingly. Also, APWD opined that 55 litres should be considered for calculation of ground water draft per person per day as the organization is following the same in practice. As discussed in the gathering of the working group and resource assessment cell, it was decided to follow the same protocol for assessment of GWRE 2022.

- In South Andaman, water for domestic need is made available by APWD from the storage of Dhanikhari Dam; accordingly, calculation for G W draft for domestic purpose is considered as '0'.

- The deduced figures of Ground Water Assessment of Andaman and Nicobar Islands are presented in the Table-3.2 as on 31st March 2022.

Table 3.2: Summary figures of GWRE 2022 – Andaman & Nicobar Islands

Ground water Assessment year & Unit	2021-2022 & Islands as Assessment Units
Total annual ground water recharge	61,842.92 Ham
Annual extractable ground water resource	55,658.64 Ham
Current Annual Gross Ground Water Draft for drinking and industrial purpose	754.81 Ham
Annual allocation of ground water for domestic water supply up to 2025	694.73Ham
Available ground water for future use for irrigation and industries	54857.99 Ham
Stage of Ground Water development	1.35 %
Categorization for future ground water development	SAFE

The available calculation and record suggested that the net annual ground water availability is 55,658.64 Ham, and 694.73 ham is allocated for domestic use upto year 2025.

Per capita consumption is taken as 55 lpcd. The available ground water for future use for irrigation and industries is 54857.99 Ham and the stage of development for the entire Union Territory is 1.35%.

As regards the static ground water resources, since detailed drilling data is not available to ascertain the average depth of saprolite (weathered mantle) and fractured horizon, it could not be attempted.

3.5 Computation of Ground Water Resources in Andaman And Nicobar Islands

Table-3.3 : Approved timelines for computation of Dynamic GWRE' 2022

S. No.	Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	Constitution of State Level Committee (SLC) on GW Resource Assessment by the concerned States/UTs	■	■	■						
2	Creation of Ground Water Resources (GWR) Assessment Cell and Deployment of District/State level officers by State Agencies	■								
3	Organizing State Level Meeting between CGWB and Nodal/GW Department of State	■	■							
4	Firming up of Assessment units as per latest data and providing 'Shape File' of the same	■	■							
5	Compilation of basic data/map/information available for each assessment units by CGWB and State GW /Nodal Department	■	■	■	■					
6	Organize an online workshop (Zone-wise) to facilitate interaction with District/State Level Officials and IIT-H		■	■						
7	Organize interactive trainings for States those facing difficulties in assessment and software handling with IITH Teams (as per request).			■	■					
8	Coordinate with the entire line department to obtain additional required crop /Irrigation data etc as per water year (June 2021 to May 2022).					■	■	■		
9	Planning of Second Workshop to review overall status of assessment exercise and other issues, if any						■	■		
10	Software Operation and exercise of assessment–wise GW Resource Assessment as per the software protocol.						■	■		
11	Approval of the State Ground Water Resources by SLC and Submission of the approved Ground Water Resources to CLEG							■	■	
12	Compilation of National Report and scrutiny for Finalization								■	
13	Approval of the National Report by Central Level Expert Group (CLEG)								■	
14	Approval by Ministry of Jal Shakti, Government of India and Publication of National Report									■

3.5.1 Salient features of the dynamic ground water resources assessments including the type assessment units, total number of assessment units in the state, base-year of collection of data, year of projection of data

i.) Assessment Unit: Inhabited islands of Andaman and Nicobar Islands.

ii.) Assessment Sub Unit: Non-Command area in the 36 Islands (29 inhabited islands) of Andaman and Nicobar group of islands.

iii.) Total number of Assessment Units in Andaman and Nicobar islands: 36 Islands (29 inhabited islands)

iv.) Total Number of sub units: 36 Islands (29 inhabited islands) - all of which are non command areas.

v.) Base Year of Data Collection: 2021-2022(As on 31.03.2022)

Table–3.4 : Island wise Recharge worthy area in Andaman & Nicobar Island

DISTRICT	Island Name/ Assessment Unit	Major Sub-Assessment Unit	Geographical Area (Ha)	Hilly Area (Ha)	Recharge Worthy Area (Ha)
N & M Andaman	Aves Island	Non-Command	20	4	16
	Baratang Island	Non-Command	29760	21560	8200
	East Island	Non-Command	611	305	306
	Interview Island	Non-Command	13300	10500	2800
	Long Island	Non-Command	1790	688	1102
	Middle Andaman	Non-Command	153550	134837	18713
	Narcondam Island	Non-Command	681	320	361
	North Andaman	Non-Command	137599	113825	23774
	North Passage Island	Non-Command	2196	1190	1006
	Porlob Island	Non-Command	845	538	307
	Smith Island	Non-Command	13717	7710	6007
	Stewart Island	Non-Command	723	360	363
	Strait Island	Non-Command	601	400	201
District Total			**355393**	**292237**	**63156**
Nicobar	Bampooka Island	Non-Command	1346	840	506
	Car Nicobar Island	Non-Command	12691	5690	7001
	Chowra Island	PGWQA	828	0	828
	Great Nicobar Island	Non-Command	104454	10043	94411
	Kamorta Island	Non-Command	18803	12802	6001
	Katchal Island	Non-Command	17430	11000	6430
	Kondul Island	Non-Command	466	123	343
	Little Nicobar Island	Non-Command	15902	12800	3102
	Nancowrie Island	Non-Command	6682	5500	1182
	Pulo Milo Island	Non-Command	134820	121623	13197
	Teressa Island	Non-Command	10126	9010	1116
	Tillangchang Island	Non-Command	1683	981	702
	Trinket Island	Non-Command	3626	2900	726
District Total			**328857**	**193312**	**135545**
South Andaman	Flatbay Island	Non-Command	936	606	330
	Havelock Island	Non-Command	11393	7560	3833
	John Lawrence Island	Non-Command	4198	3190	1008
	Little Andaman	Non-Command	73439	68649	4790
	Neil Island	Non-Command	1890	647	1243
	North Sentinnel Island	Non-Command	5967	5060	907
	Peel Island	Non-Command	435	250	185
	Rutland Island	Non-Command	129	34	95
	South Andaman	Non-Command	2470	1579	891
	Viper Island	Non-Command	50	26	24
District Total			**100907**	**87601**	**13306**
STATE TOTAL			**785157**	**573150**	**212007**

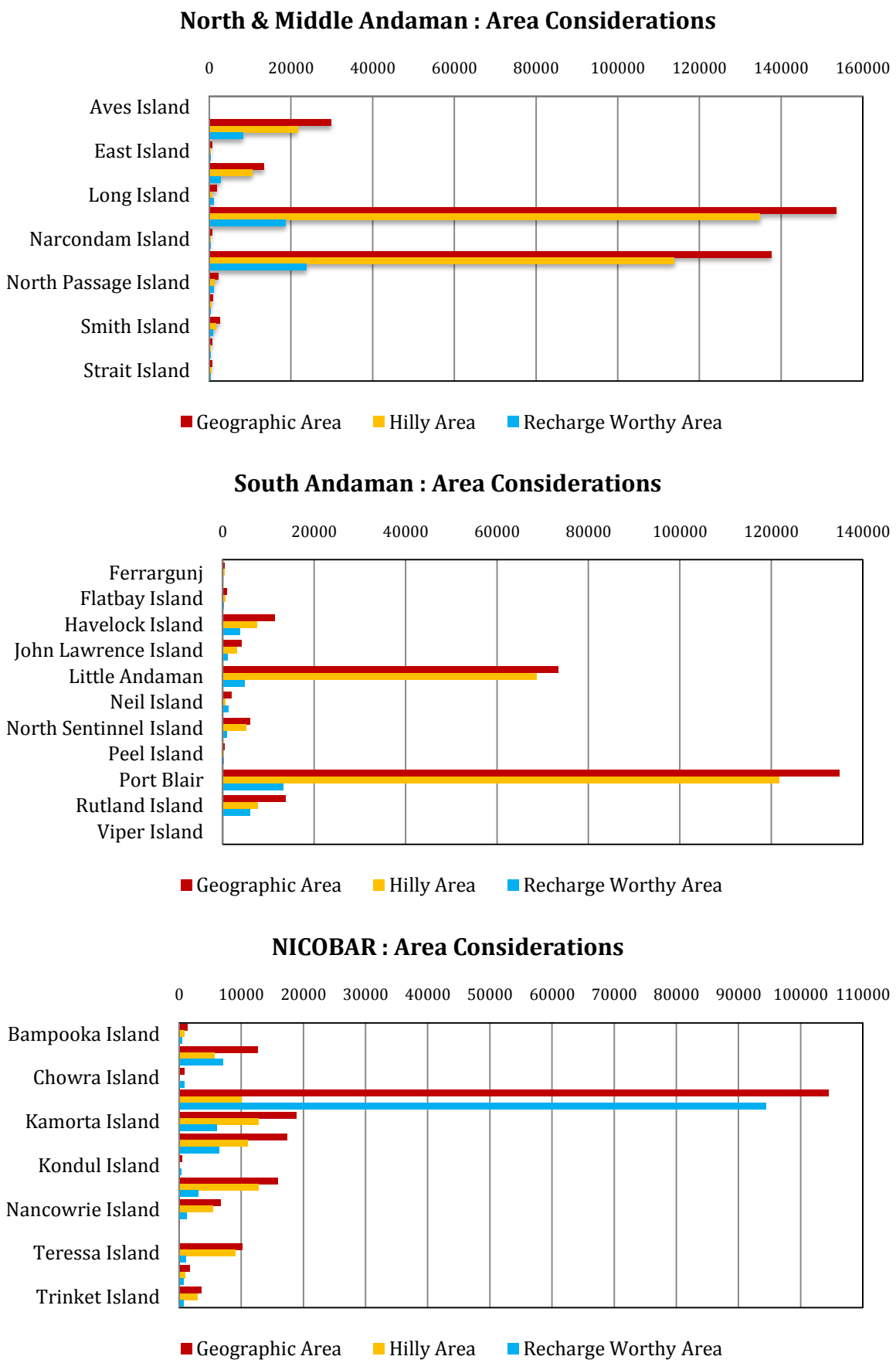


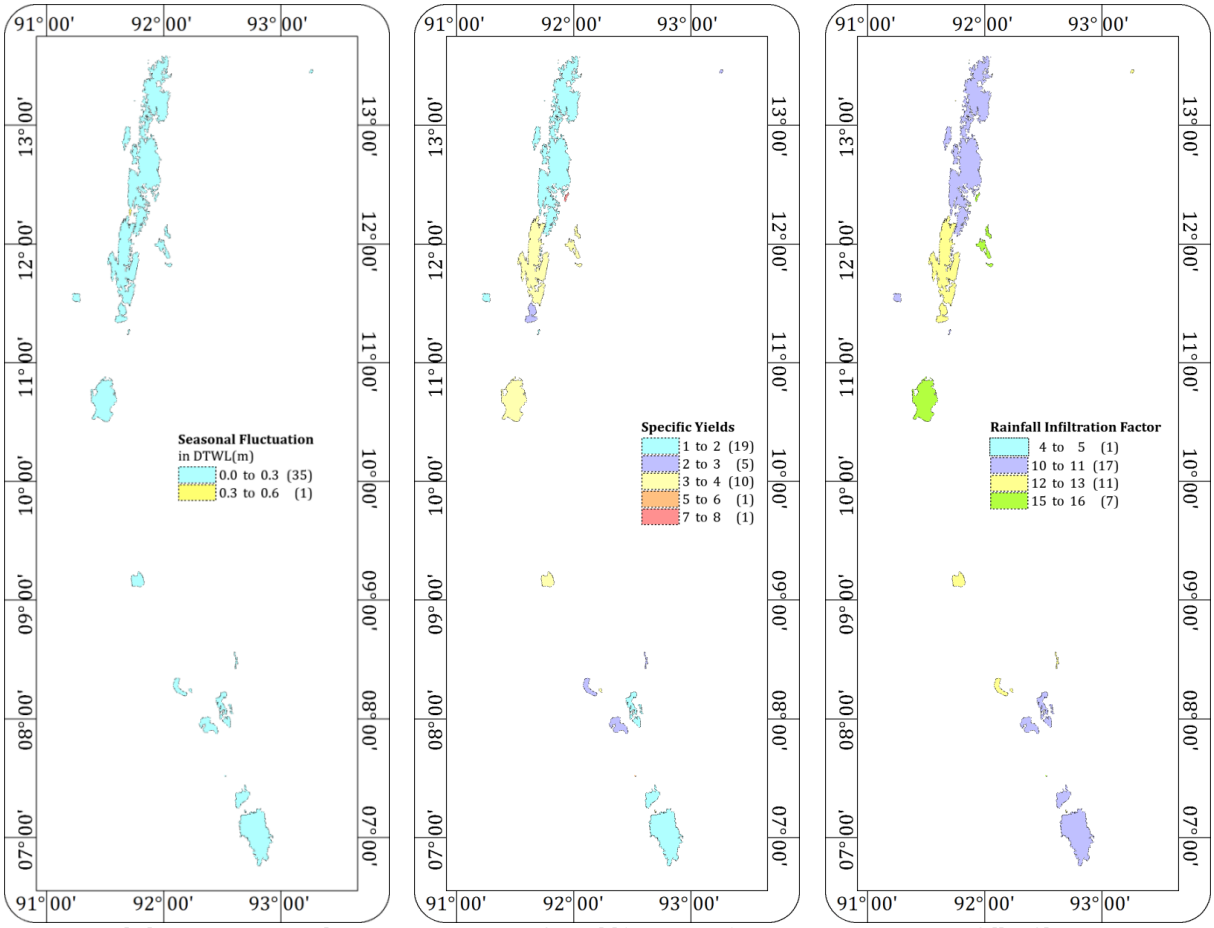
Figure – 3.1 : District & Island wise Area Considered for GWRE 2022 in A & N Islands

3.5.2 Assessment sub-unit-wise method adopted for computing rainfall recharge during monsoon season (WLF/RIF)

Rainfall infiltration (RIF) method has been adopted for computing rainfall recharge during monsoon as well as non monsoon.

Table–3.5 : Input variables used in GWRE 2022 in Andaman & Nicobar Island

Sl	District	Island / Assessment Unit Name	Annual Rainfall (mm)	Specific Yield (Normative)	Rainfall Infiltration Factor (Normative)
1	N & M Andaman	Aves Island	3015.7	1	4
2		Baratang Island	3015.7	1	10
3		East Island	3015.7	1	10
4		Interview Island	3015.7	1	10
5		Long Island	3015.7	7	15
6		Middle Andaman	3015.7	1	10
7		Narcondam Island	3015.7	2	12
8		North Andaman	3015.7	1	10
9		North Passage Island	3015.7	1	15
10		Porlob Island	3015.7	1	10
11		Smith Island	3015.7	3	12
12		Stewart Island	3015.7	1	12
13		Strait Island	3015.7	3	12
14	Nicobar	Bampooka Island	2805.2	3	12
15		Car Nicobar Island	2805.2	3	12
16		Chowra Island	2805.2	5	15
17		Great Nicobar Island	2805.2	1	10
18		Kamorta Island	2805.2	1	10
19		Katchal Island	2805.2	2	10
20		Kondul Island	2805.2	3	12
21		Little Nicobar Island	2805.2	1	10
22		Nancowrie Island	2805.2	1	10
23		Pulo Milo Island	3015.7	1	10
24		Teressa Island	2805.2	2	12
25		Tillangchang Island	2805.2	2	12
26		Trinket Island	2805.2	1	10
27	South Andaman	Flatbay Island	3015.7	1	10
28		Havelock Island	3015.7	3	15
29		John Lawrence Island	3015.7	3	15
30		Little Andaman	3015.7	3	15
31		Neil Island	3015.7	3	15
32		North Sentinnel Island	3015.7	1	10
33		Peel Island	3015.7	1	10
34		Rutland Island	2805.2	2	12
35		South Andaman	3015.7	3	12
36		Viper Island	3015.7	1	10



A. Seasonal Fluctuation in Depth to Water Level **B. Specific Yield(Normative)** **C. Rainfall Infiltration Factor(Normative)**

Figure–3.2 : Spatial Distribution of Input variables used in GWRE 2022 in A & N Islands

3.5.3 The total resources of the state, existing development, balance available for future development, stage of development, categorization of assessment units and other relevant salient features of the resources assessment in the state

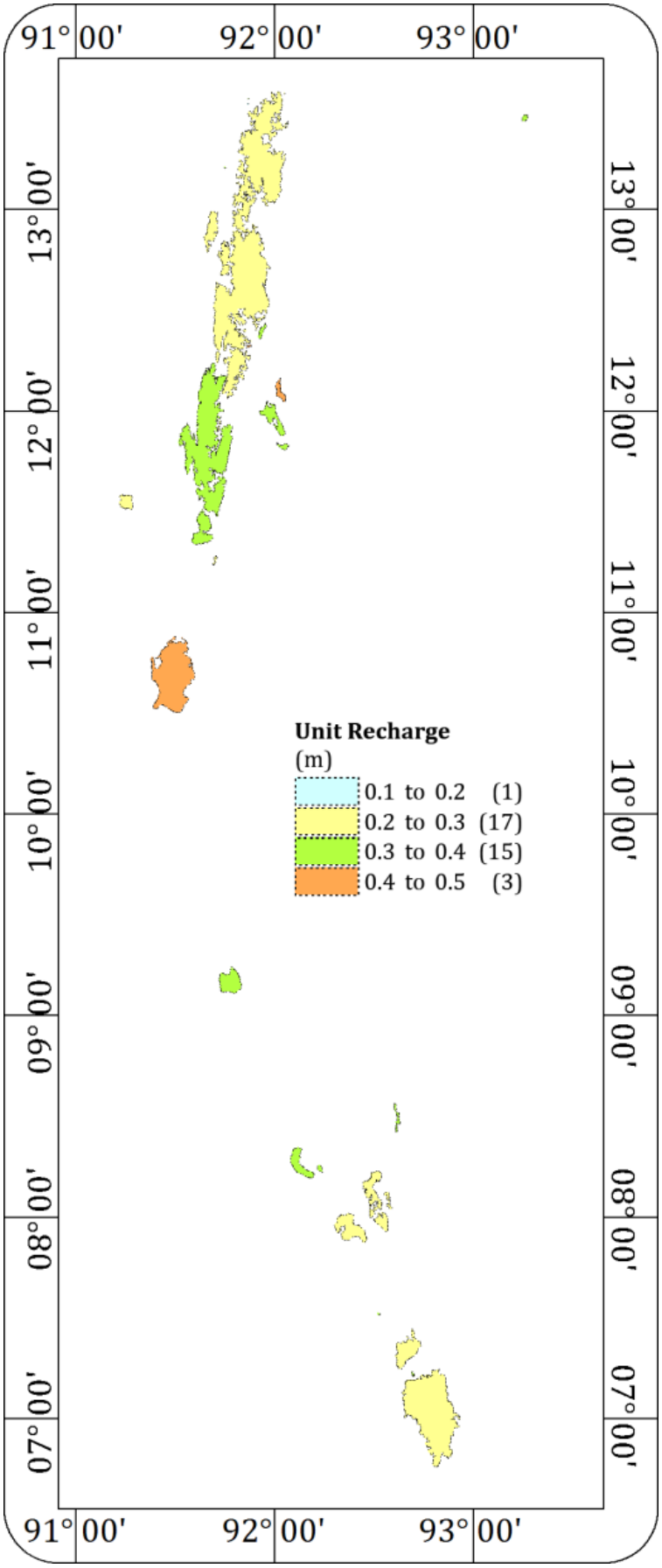
For estimation of dynamic ground water resources of Andaman and Nicobar islands, Rainfall infiltration Factor (RIF) has been adopted for computation. Total 36 Islands (29 inhabited islands) have been taken into account for ground water resource calculation. These 36 islands are belonging to three districts namely North & Middle Andaman district, South Andaman district and Nicobar district. For three districts stage of ground water development ranges from 0.28 % to 3.44 %, with the overall Stage of Ground Water Abstraction being pegged at 1.35% . Out of all the assessed islands – 1 is Hilly, 1 is Saline(Poor Ground Water Quality Area) and rest are classified under Safe category.

3.5.4 Spatial variation of the Ground water recharge and development scenario in the State/ district-wise:

District wise variations of recharge from rainfall during monsoon have been assessed. Total annual recharge in the Andaman and Nicobar Island is estimated as **62,191.32** ham and total natural discharges is calculated as **6,219.12** ham. Net ground water availability(annual extractable ground water resources) of the island is estimated as **55,972.20 ham.**

Table–3.6 : Computed Recharge(GWRE 2022) in Andaman & Nicobar Island

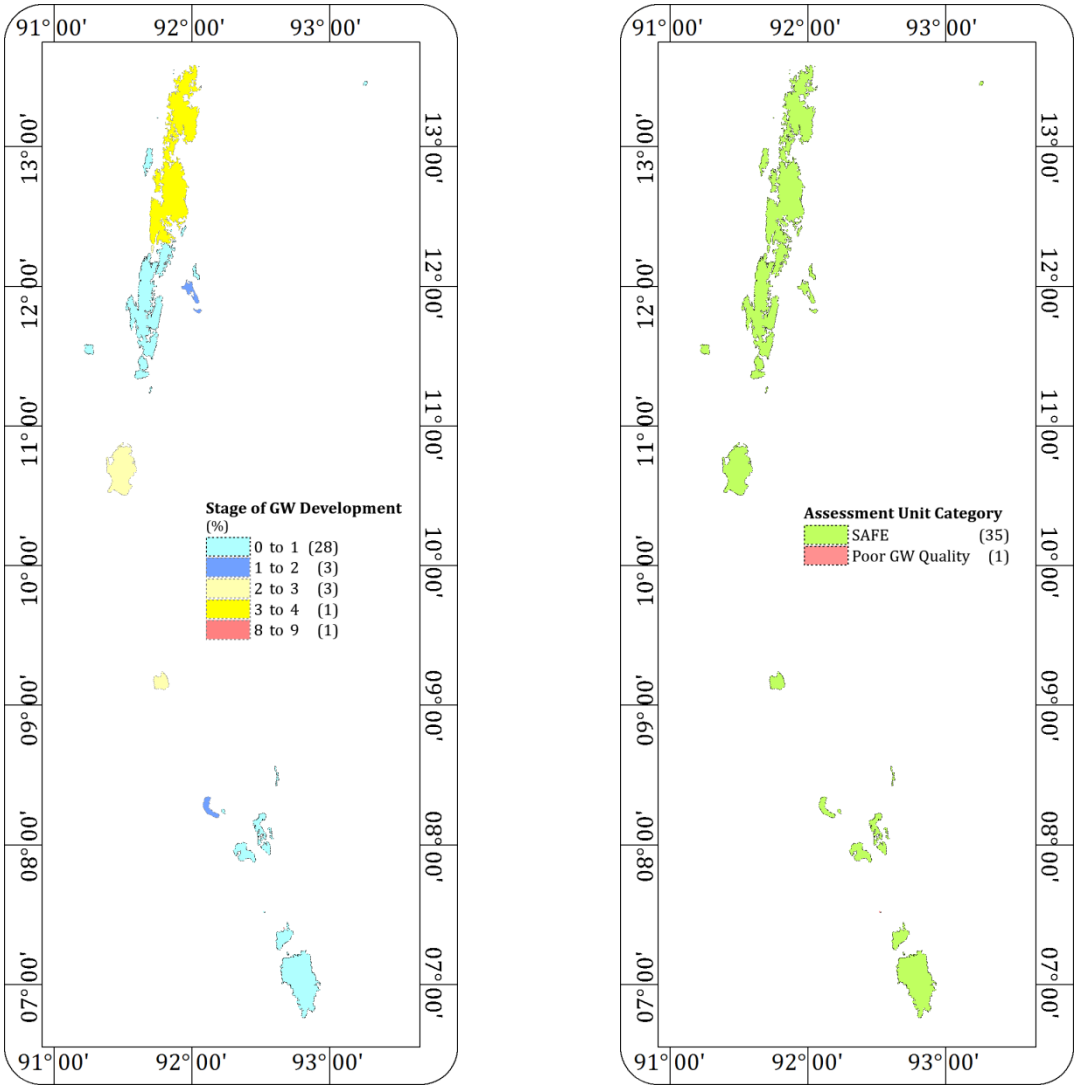
Sl	DISTRICT	Island / Assessment Unit Name	Annual Recharge(Ham)			Natural Discharge during non-monsoon season (Environmental Flow) (Ham)	Annual Extractable Recharge (Ham)	Unit Recharge (m)
			From Rainfall	From Other Sources	Total Annual Recharge			
1	N & M Andaman	Aves Island	1.93	0	1.93	0.19	1.74	0.109
2		Baratang Island	2472.87	0.16	2473.03	247.3	2225.73	4.399
3		East Island	92.28	0	92.28	9.23	83.05	0.010
4		Interview Island	844.4	0	844.4	84.44	759.96	0.109
5		Long Island	440.4	0	440.4	44.04	396.36	0.479
6		Middle Andaman	4985.63	6.65	4992.28	499.23	4493.05	14.683
7		Narcondam Island	130.64	0	130.64	13.06	117.58	0.356
8		North Andaman	6334.01	5.82	6339.83	633.98	5705.85	0.060
9		North Passage Island	455.07	0	455.07	45.51	409.56	0.107
10		Porlob Island	92.59	0	92.59	9.26	83.33	0.030
11		Smith Island	2173.84	0	2173.84	217.39	1956.45	1.941
12		Stewart Island	131.36	0	131.36	13.13	118.23	0.020
13		Strait Island	72.74	0	72.74	7.28	65.46	0.010
District Total			**18227.76**	**12.63**	**18240.39**	**1824.04**	**16416.35**	**0.125**
14	Nicobar	Bampooka Island	170.33	0	170.33	17.03	153.3	0.447
15		Car Nicobar Island	2356.7	0.16	2356.86	235.68	2121.18	0.443
16		Chowra Island	348.4	0	348.4	34.84	313.56	0.101
17		Great nicobar Island	26484.18	0.84	26485.02	2648.5	23836.52	21.630
18		Kamorta Island	1683.4	0	1683.4	168.34	1515.06	0.081
19		Katchal Island	1803.74	0	1803.74	180.37	1623.37	1.373
20		Kondul Island	115.46	0	115.46	11.55	103.91	0.288
21		Little Nicobar Island	870.17	0	870.17	87.02	783.15	0.630
22		Nancowrie Island	331.57	0	331.57	33.16	298.41	0.013
23		Pulo Milo Island	3516.02	10.81	3526.83	352.68	3174.15	3.155
24		Teressa Island	375.67	0	375.67	37.57	338.1	0.373
25		Tillangchang Island	236.31	0	236.31	23.63	212.68	1.150
26		Trinket Island	203.65	0	203.65	20.36	183.29	0.597
District Total			**38495.6**	**11.81**	**38507.41**	**3850.73**	**34656.68**	**0.608**
27	South Andaman	Flatbay Island	99.52	0.04	99.56	9.95	89.61	0.007
28		Havelock Island	1531.81	0.41	1532.22	153.22	1379	14.516
29		John Lawrence Island	455.98	0	455.98	45.6	410.38	0.068
30		Little Andaman	2166.78	1	2167.78	216.77	1951.01	2.190
31		Neil Island	496.75	0.25	497	49.7	447.3	1.232
32		North Sentinnel Island	273.53	0	273.53	27.36	246.17	1.225
33		Peel Island	55.79	0	55.79	5.58	50.21	0.045
34		Rutland Island	31.98	0	31.98	3.2	28.78	0.041
35		South Andaman	322.44	0	322.44	32.25	290.19	0.400
36		Viper Island	7.24	0	7.24	0.72	6.52	0.272
District Total			**5441.82**	**1.7**	**5443.52**	**544.35**	**4899.17**	**0.210**
U/T TOTAL			**62165.18**	**26.14**	**62191.32**	**6219.12**	**55972.2**	**0.264**



Figure–3.3 : Spatial Distribution of computed Unit Recharge in GWRE 2022 in A & N Islands

Table–3.7 : Computed Ground Water Drafts(GWRE 2022) in Andaman & Nicobar Island

Sl	DISTRICT	Island/ Assessment Unit Name	Annual Extractable Recharge (Ham)	Draft Component(Ham)				Stage Of Ground Water Development (%)	Category
				Irrigation Draft	Domestic Draft	Industrial Draft	Gross Ground Water Draft		
1	N & M Andaman	Aves Island	1.74	0	0.004015	0	0	0.034	Safe
2		Baratang Island	2225.73	0	13.534565	4.501105832	18.04	0	Safe
3		East Island	83.05	0	0.0381425	0	0.04	0.004	Safe
4		Interview Island	759.96	0	0.036135	0	0.03	0.493	Safe
5		Long Island	396.36	0	2.45718	0.816943584	3.28	2.021	Safe
6		Middle Andaman	4493.05	0.75	132.43076	44.04291684	177.22	0.042	Safe
7		Narcondam Island	117.58	0	0.0381425	0	0.04	0	Safe
8		North Andaman	5705.85	0.054	101.2583	33.67596609	134.99	0	Safe
9		North Passage Island	409.56	0	0.00803	0	0.01	0.858	Safe
10		Porlob Island	83.33	0	0	0	0	0.092	Safe
11		Smith Island	1956.45	0	0.8250825	0	0.82	0	Safe
12		Stewart Island	118.23	0	0.004015	0	0	0	Safe
13		Strait Island	65.46	0	0.092345	0	0.09	0.828	Safe
	District Total		**16416.35**	**0.804**	**250.7267125**	**83.03693235**	**334.56**	**2.04**	**SAFE**
14	Nicobar	Bampooka Island	153.3	0	0	0	0	0.137	Safe
15		Car Nicobar Island	2121.18	0.1984	42.466655	0.1984	42.86	0.042	Safe
16		Chowra Island	313.56	0	3.023295	0	3.03	0	Safe
17		Great nicobar Island	23836.52	0.0294	19.15155	0.142838356	19.32	0.002	Safe
18		Kamorta Island	1515.06	0.009	8.7787975	0.136131507	8.92	0	Safe
19		Katchal Island	1623.37	0.006	4.6031975	0.135145205	4.74	0.011	Safe
20		Kondul Island	103.91	0	0	0	0	1.619	Safe
21		Little Nicobar Island	783.15	0	0.7166775	0	0.72	2.32	Safe
22		Nancowrie Island	298.41	0.0102	2.42506	0.136526027	2.56	1.946	Safe
23		Pulo Milo Island	3174.15	10.4	241.6889475	13.296	265.38	8.361	Safe
24		Teressa Island	338.1	0	6.39188	0.194323288	6.58	0.012	Safe
25		Tillangchang Island	212.68	0	0.0903375	0	0.09	0	Safe
26		Trinket Island	183.29	0	0	0	0	0.048	Safe
	District Total		**34656.68**	**10.653**	**329.3363975**	**14.23936438**	**354.2**	**1.02**	**SAFE**
27	South Andaman	Flatbay Island	89.61	0	0.012045	0	0.01	0	Safe
28		Havelock Island	1379	0.009	15.03216	0.009	15.05	0.811	Safe
29		John Lawrence Island	410.38	0	0	0	0	1.091	Safe
30		Little Andaman	1951.01	0.232	44.803385	0.232	45.27	0.174	Safe
31		Neil Island	447.3	0.006	7.23503	0.006	7.24	0.589	Safe
32		North Sentinnel Island	246.17	0	0.036135	0	0.03	0.292	Safe
33		Peel Island	50.21	0	0	0	0	0	PGWQA
34		Rutland Island	28.78	0	0.04818	0	0.05	0.081	Safe
35		South Andaman	290.19	0	1.4273325	0	1.43	3.944	Safe
36		Viper Island	6.52	0	0	0	0	2.366	Safe
	District Total		**4899.17**	**0.247**	**68.5942675**	**0.247**	**69.08**	**1.41**	**SAFE**
	STATE TOTAL		**55972.2**	**11.704**	**648.6573775**	**97.52329673**	**757.84**	**1.35**	**SAFE**



A. Stage of Ground Water Development B. Categorization of Assessment Units

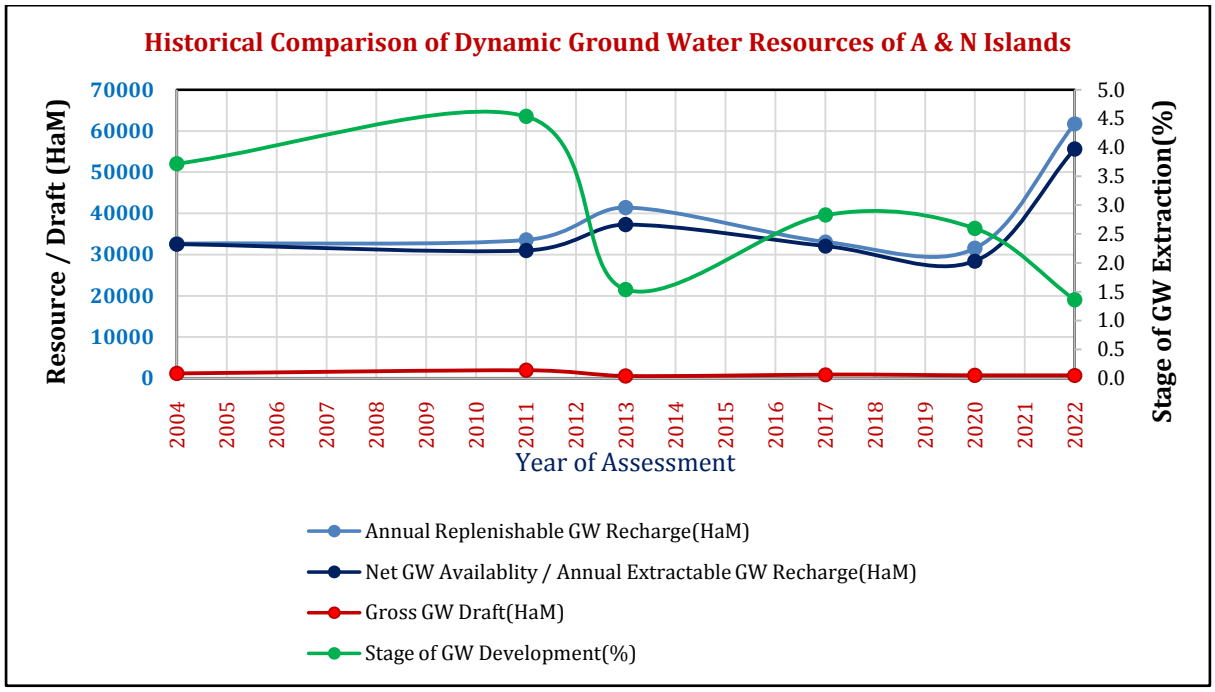
Figure–3.4 : Spatial Distribution of Stage of Ground Water Development & Categorization of Assessment Units in GWRE 2022 in A & N Islands

3.5.5 Comparison with the earlier ground water resources estimate and reasons for significant departure from earlier estimates.

The loss in surface area in some of the highly earthquake devastated islands have made possible changes in freshwater volume in the islands. In 11 (Eleven) islands parts of their area have been submerged due to tsunami/earthquake effect. It's important to note that parts of the Andaman group of islands and the entire Nicobar group of islands were subsided during the plate collision and submerged. Net availability of ground water resources have been increased in comparison to the values obtained in previous ground water resource estimation in the islands in 2004, 2011, 2013, 2017 & 2020.

Table–3.8 : Comparison between GWRE in Andaman & Nicobar Island over time

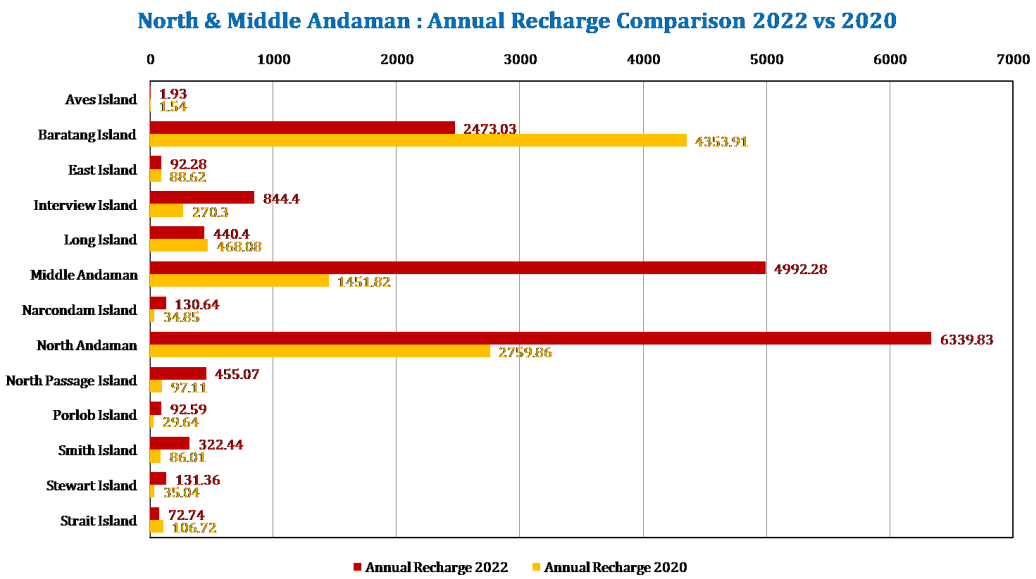
	Assessment year					
	2004	2011	2013	2017	2020	2022
Annual Replenishable GW Recharge(HaM)	32673	33561	41449	33158	31551	61817
Net GW Availability / Annual Extractable GW Recharge(HaM)	32599	31023	37304	32132	28492	55659
Gross GW Draft(HaM)	1197.4	1965.6	573.53	908.18	739.49	754.81
Stage of GW Development(%)	3.72	4.54	1.54	2.83	2.60	1.36
Categorization	SAFE	SAFE	SAFE	SAFE	SAFE	SAFE

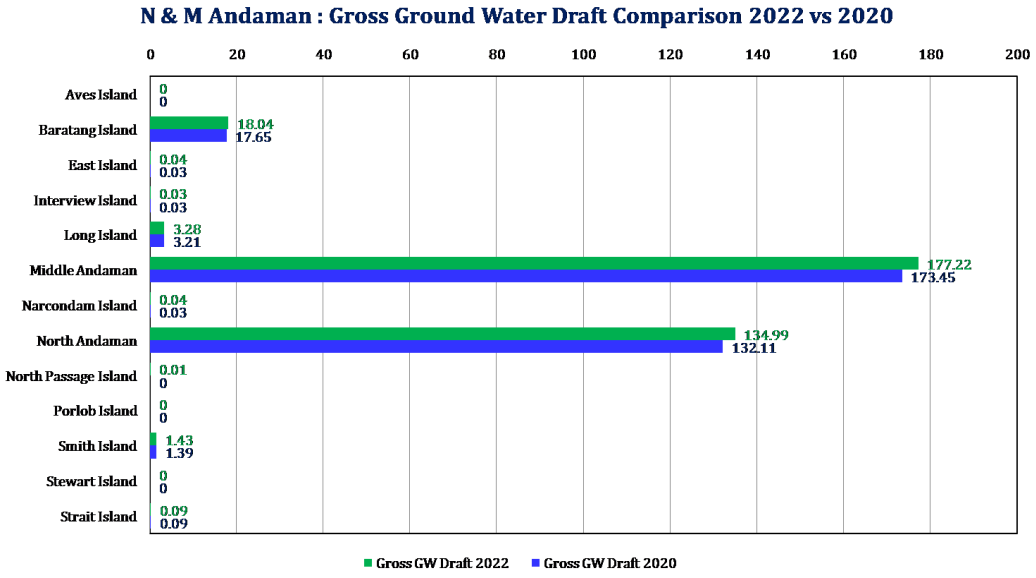


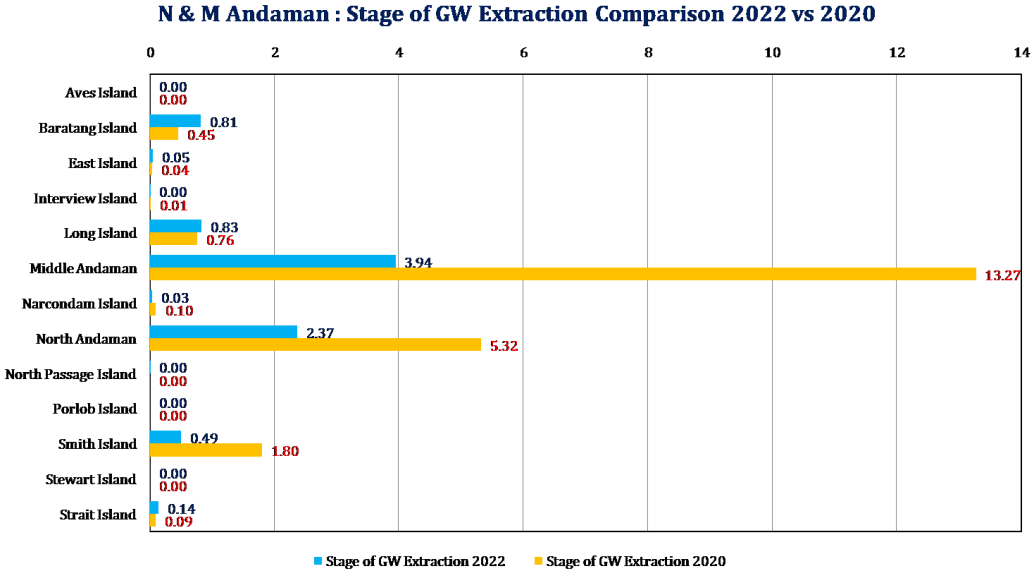
Figure–3.5 : Historical comparison GWRE over time in A & N Islands

Table–3.9 : Comparison between GWRE'2022 vs GWRE'2020 in Andaman & Nicobar Island

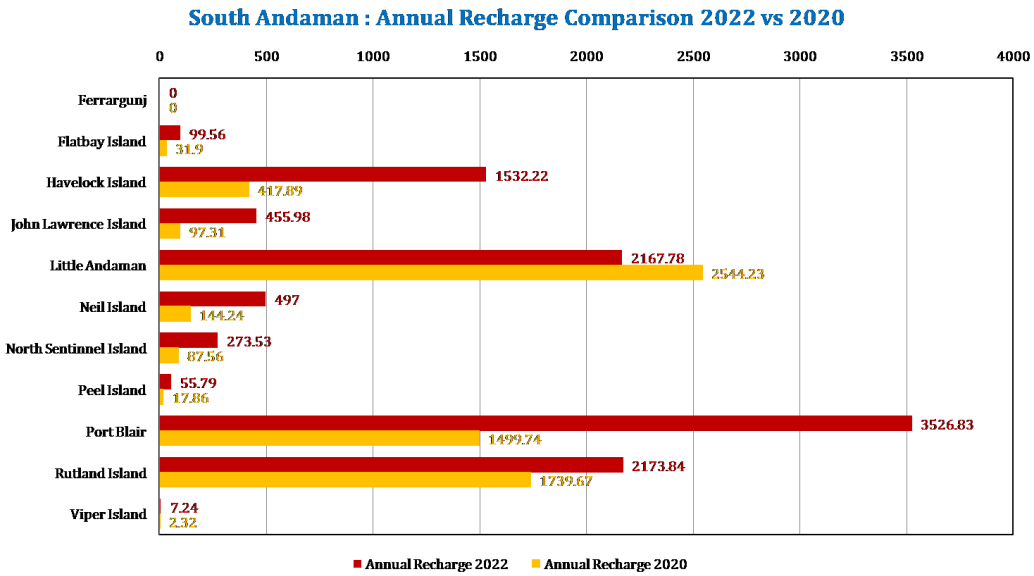
S. No	District	Year	Annual Replenishable Recharge (HaM)			Environmental Flow (HaM)	Annual Extractable Recharge (HaM)	Ground Water Extraction (HaM)				Stage of GW Extcaction (%)	Category
			Rainfall	Other Sources	Total			Domestic	Industrial	Irrigation	Gross		
1	N & M Andaman (Fresh)	2022	16376.36	12.63	16388.99	1638.9	14750.09	251.33	83.04	0.8	335.17	2.27	SAFE
		2020	9770.87	12.63	9783.5	978.34	8805.16	244.17	83.04	0.8	327.99	3.72	SAFE
2A	Nicobar (Fresh)	2022	34663.16	1	34664.16	3466.4	31197.75	84.67	0.94	0.25	85.84	0.28	SAFE
		2020	15184.09	1	15185.09	1518.51	13666.58	82.26	0.94	0.44	83.63	0.61	SAFE
2B	Nicobar (PGWQA)	2022	348.40	0.00	348.40	34.84	313.56	3.02	0.00	0.00	3.03	0.97	SALINITY
		2020	299.74	0.00	299.74	29.97	269.77	2.94	0.00	0.00	2.94	1.09	SALINITY
3	South Andaman (Fresh)	2022	10777.26	12.51	10789.77	1078.97	9710.80	309.63	13.54	10.65	333.80	3.44	SAFE
		2020	6570.21	12.51	6582.72	562.40	6020.32	300.82	13.54	13.54	327.87	5.45	SAFE
	STATE TOTAL (Fresh)	**2022**	**61816.78**	**26.14**	**61842.92**	**6184.28**	**55658.64**	**645.63**	**97.52**	**11.70**	**754.81**	**1.36**	**SAFE**
		2020	**31525.17**	**26.14**	**31551.31**	**3059.25**	**28492.06**	**627.25**	**97.52**	**14.78**	**739.49**	**2.6**	**SAFE**
	STATE TOTAL (PGWQA)	**2022**	**348.40**	**0.00**	**348.40**	**34.84**	**313.56**	**3.02**	**0.00**	**0.00**	**3.03**	**0.97**	**SALINE**
		2020	299.74	0.00	299.74	29.97	269.77	2.94	0.00	0.00	2.94	1.09	SALINE

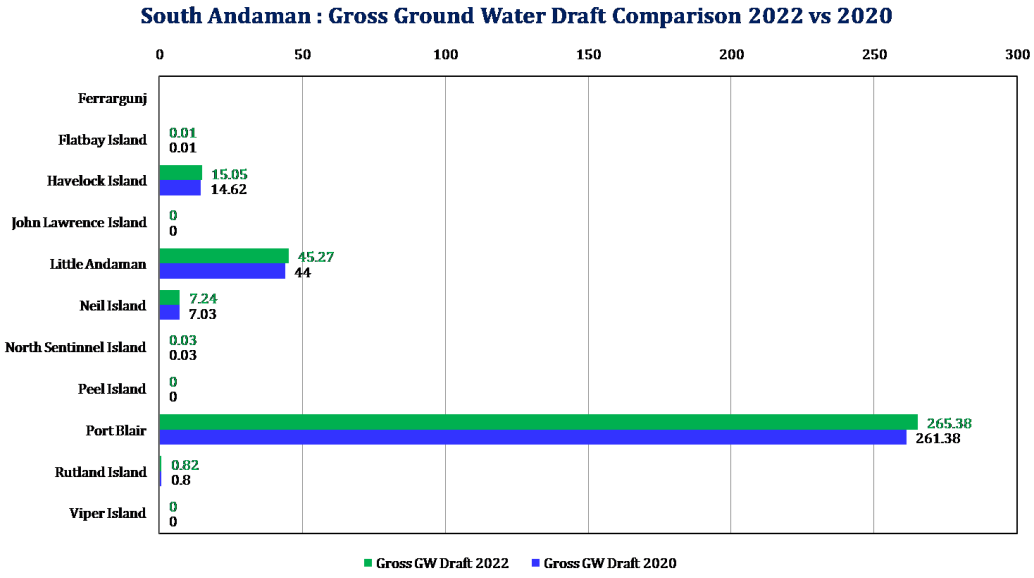


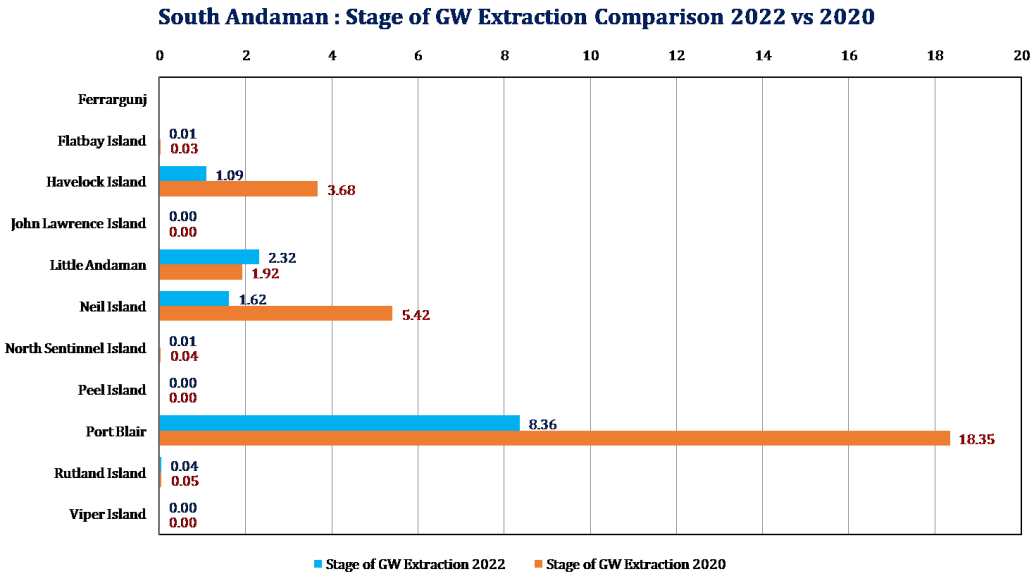




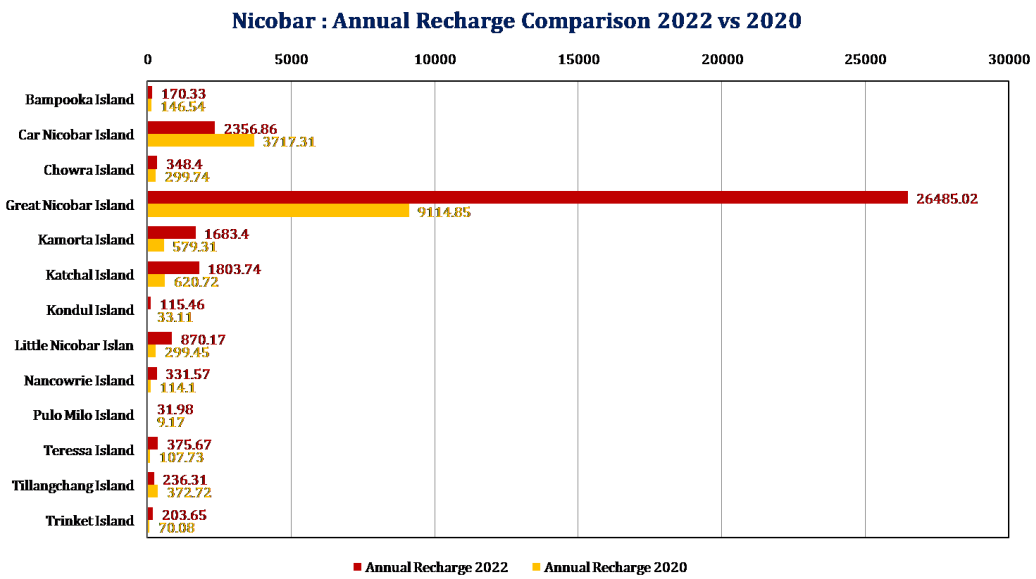
Figure–3.6 : GWRE 2022 vs 2020 – North & Middle Andaman District

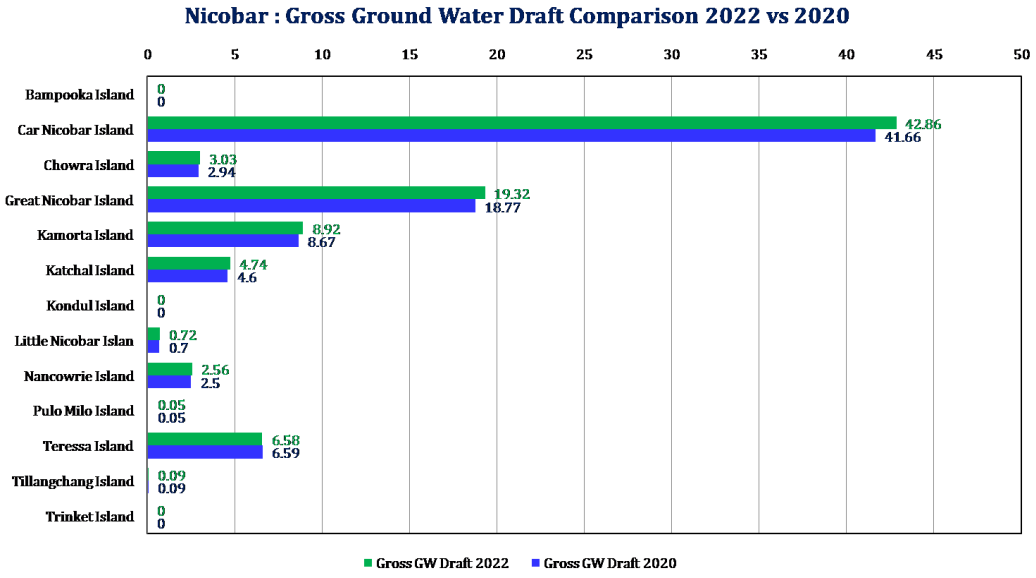


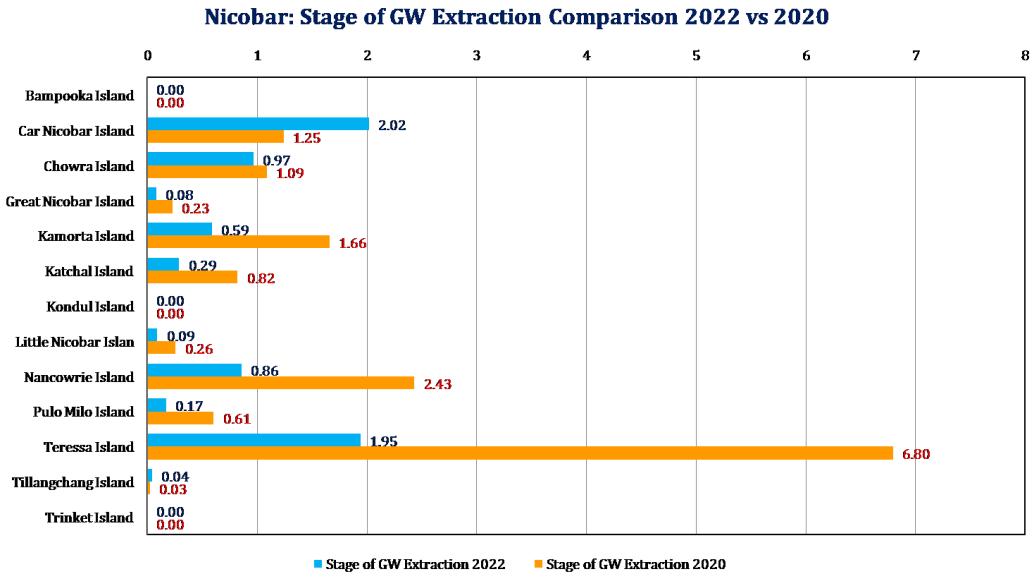




Figure–3.7 : GWRE 2022 vs 2020 – South Andaman District







Figure–3.8 : GWRE 2022 vs 2020 – Nicobar District

3.5.6 Ground water recharge in the poor quality zone

The topography of Chowra Island is such that whatever may be the rain fall gets recharged does not reside into the aquifer and it immediately gets discharged into the sea.

3.5.7 Additional annual potential recharges

In all the assessment units, computation of rainfall recharge during monsoon and non monsoon has been computed using only Rainfall Infiltration Method (RIF). So, Percent Deviation (PD) factor as per the guidelines by GEC'97 methodology does not arise here.

The SLC formation order, as well as the Minutes of the SLC Meeting of 30.08.2022, containing the approval of the GWRE 2022 in respect of the UT of A & N Islands is attached as annexure.

General description of the ground water assessment unit, recharge from rainfall, recharge from other sources, natural discharge and annual extractable ground water resource, ground water extraction, annual ground water allocation for domestic Use as on 2025, net ground water availability for future use, stage of ground water extraction and categorization assessed in dynamic ground water resources of the Andaman and Nicobar islands (as on 31st march 2022) as computed through INGRES is provided in the subsequent Annexures(1 – 5) and attribute table.

RECOMMENDATIONS

Andaman & Nicobar Islands comprise an arc-shaped chain of islands in the Bay of Bengal and are characterized by rugged topography, steep slope, low infiltration capacity and close proximity of hills to the sea. Marine sedimentary group of rocks comprising shale, sandstone, grit and conglomerate; extrusive and intrusive igneous rocks (volcanics and ultramafics) and limestone occupy the entire geographical area. Amongst these, the Sedimentary Group is most pervasive and occupy nearly 70% of the entire area of the islands while the igneous group covers nearly 15% while the rest of 15% goes to the coralline and limestone formations. All these rock formations have been subjected to many tectonic activities, evident from the occurrence of shallow and deep focus earthquakes in the islands. Marine sedimentary rocks are developed only through dug wells having meager yield of 0.1 to 0.5 lps. The igneous Ophiolite suite of rocks in the area although restricted in occurrence, are observed to yield moderate to high both in shallow and deeper locales and they are developed by dug wells and bore wells

with yield ranging from 1 to 10 lps. Area covered by Coralline Limestone contains appreciable quantity of groundwater with yield ranging from 5 to25 lps.

- Island Hydrogeological set up demands judicious and measured(regulated) use of fresh water lenses seasonally (though falls under Safe category).

- State may review their free/subsidized electricity policy to farmers (if applicable), bring suitable water pricing policy and may work further towards crop rotation/diversification/other initiatives to reduce overdependence on groundwater.

- Regulation & control of Ground water Extraction: Ministry of Jal Shakti has issued the guidelines for control and regulations of ground water extraction vide notification dated 24.09.2020. Concerned departments may ensure implementations of the guidelines.

REFERENCES

Central Ground Water Board, 2013: Ground Water Information Booklet, North-Middle Andaman District, A & N Islands, Scientific Report Series "E", Serial No. 47

Central Ground Water Board, 2013: Ground Water Information Booklet, South Andaman District, A & N Islands, Scientific Report Series "E", Serial No. 49

Central Ground Water Board, 2013: Ground Water Information Booklet, Nicobar District, A & N Islands, Scientific Report Series "E", Serial No. 50

ANNEXURES

Telefax: 03192-233094

अण्डमान निकोबार राज्य जल एवं स्वच्छता मिशन

ANDAMAN NICOBAR STATE WATER AND SANITATION MISSION

(समीति पंजीकरण अधिनियम 1860 के अंतर्गत पंजीकृत समीति)

(A Society registered under Society Registration Act 1860)

मुख्य अभियंता कार्यालय परिसर, अ०लो०नि०वि०, निर्माण भवन, पोर्टब्लेयर

CE's OFFICE COMPLEX, APWD, NIRMAN BHAWAN, PORTBLAIR

पंजीकरण सं. 1352

Registration No.1352

No.1-20/ANSWSM/CGWB/2021-22/402 Port Blair date the 18th Feb. 2022

To

The Regional Director,
Centarl Ground Water Board,
Eastern Region,
Bhujalika, Sector-V, CP-6 Block,
Salt Lake City.

Sub: Assesment of Ground Water Resources of Andaman & Nicobar Islands as in 2022-reg.

Ref: No.6-14/CGWB/M(SOUTH)/RESOURCES/2018-2022-404 dt.20/01/2022

Sir,

With respect to above refrence, I am directed to convey the approval of competent authority that existing State Level Committee formed vide Order No.3462 dt.09/11/2018 for assement of dynamic ground water resources shall henceforth act as regular State Level Committee(SLC) for all future periodic re-assesment of Ground Water Resources in Andaman & Nicobar Islands. Copy of order along with approval of competent authority is enclosed for ready reference.

Encl: - A/A

Yours faithfully,

Director/ANSWSM

Copy to:

1) The PS to Sectary (PWD) for kind information of the Secretary (PWD)please
2) The Chief Engineer, APWD Port Blair for kind information pleases.
3) The Under Secretary(GW), DoWR, RD & GR to GoI, MoJS Shram Shakthi Bhawan, New Delhi for information.

Director/ANSWSM

अण्डमान तथा निकोबार प्रशासन
ANDAMAN & NICOBAR ADMINISTRATION
सचिवालय / SECRETARIAT
*****

(12)

Port Blair, dated the 9h November, 2018

ORDER NO. ..3462

The Chief Secretary, A & N Administration is pleased to constitute the State Level Committee in connection with reassessment of Dynamic Ground Water Resource as desired by Ministry of Water Resources, RD&GR, Central Ground Water Board. The composition of the committee is as under: -

1.	Principal Secretary (PWD)	Chairman
2.	Secretary (Department of Science & Technology)	Member
3.	Chief Engineer, APWD	Member
4.	Superintending Hydrogeologist, CGWB	Member
5.	Director (Agriculture)	Member
6.	Director (Industries)	Member
7.	Director (ANSWSM), CE's Office, APWD	Member
8.	Representative from NABARD	Member
9.	Regional Director, CGWB	Member Secretary

Charter

- Under the directive of MoWR, Dynamic groundwater (GW) resources assessment of entire country has been continuing following Groundwater Estimation Committee (GEC) norm-1997.
- The assessment is done by CGWB, the apex GW organization in MoWR in liaison with the concerned State/UT Govt. / Administration where Ground Water Research and development Department is existing.
- The GEC 1997 had continued till 2013 for groundwater resource assessment for the entire country.
- The GEC-1997 norm has been modified in 2015 as per the directive of MoWR and regarding the GW Resources assessment as per GEC-2015, MoWR has directed CGWB to approach all State/UT GoVT. to assess the GW resources for 2017.
- Since rainfall is the prime source of recharge to GW and the rainfall for the entire year of 2016-2017 is available, the GEC committee has recommended to MoWR to assess it for a calendar year 2016-2017 ending in 31.3.2017.
- In A&N Islands, the Resource is calculated by CGWB in the absence of R&D Department on GW in A&N Admn. CGWB renders all needful help in matter of Water Resources Development and management, particularly GW to A & N Admn.
- Since ground water is a scarce commodity in A & N Islands, as also in view of extreme population pressure on the islands due to tourism boom, CGWB, Govt. of India has recommended GW Resources estimation in A&N Islands at a regular interval as in other parts of India.
- MoWR had earlier desired to calculate the GW resources of the entire country including A&N Islands.
- As per this norm, the state/UT-wise dynamic groundwater resources are being estimated at regular interval.

....contd/-

(12)

- The basic groundwater resource assessment unit is an Administrative Blo[illegible] some cases i.e. in few north-eastern states, where block boundaries are not defined the assessment is done as per watershed basis.
- In A & N islands, it is done island-wise for the inhabited islands.
- The GW Resources of A&N Islands, being assessed, need to be put forward before a committee for their understanding it as also to know the status of GW resources development in various Inhabited Island.
- In A & N Islands, APWD is the nodal Stake holder Department beside others. Accordingly the name and Head of various Stake holder Departments are proposed for constitution of a committee with the approval of the competent authority in A & N Admn.
- In view of above the task was given by MoWR to CGWB for needful.
- A & N Island falls under the jurisdiction of CGWB, Eastern Region Kolkata. CGWB, Kolkata is already on the job for calculation of dynamic groundwater resources of A&N Islands.

Time-Line

- As per the directive of MoWR, RD & GR, the report is to be finalized and approved by the state/UT level committee positively by November, 2018.
- CGWB has already made progress regarding assessment of groundwater resources.
- Is proposed to reconcile the resources as per methodology with the stakeholder departments of A & N Admn. by 25th November before its presentation and approval by the Chairman of the assessment committee by 30th November.

Deputy Secretary (PWD)
(F.No.29-20/2018-PWD)

ORDER BOOK

Copy to:-

1. Sr. PS to Chief Secretary for kind information of Chief Secretary, A & N Administration, Port Blair.
2. PS to Principal Secretary (PWD) for kind information of Principal Secretary (PWD), A & N Administration.
3. All Concerned.

Deputy Secretary (PWD)

O/C

Issued
9/11/18

Minutes of the Meeting of State Level Committee for Assessment of Ground Water Resources of Andaman & Nicobar Islands(as on 31.03.2022), held online on 30.08.2022

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The meeting of the State Level Committee for assessment of Ground Water Resources of Andaman & Nicobar Islands(as on 31.03.2022) was held online on 30.08.2022 at 1130 Hrs on Google Meet Platform, under the Chairmanship of the Secretary, PWD, Andaman & Nicobar Administration. The lists of attendees are provided as Annexure – 1. The agenda of the meeting was as follows:

1. Welcome and Introduction of all the members and distinguished invitees.

2. Background of the meeting and sharing of Meeting Agenda.

3. Presentation of the results of Ground Water Resource Assessment - 2022 of Andaman & Nicobar Islands and its comparative study with assessment of 2020.

4. Any other items with the permission of the Chair.

At the very outset, with the kind permission of the Chair, Dr Anadi Gayen, Regional Director (I/C), Central Ground Water Board (CGWB), Eastern Region(ER), Kolkata and Member Convenor, SLC, welcomed all the Members of the SLC, and other distinguished invitees of the meeting and narrated the agenda, in detail and also appraised the Chair about the background of the meeting.

Shri Anirvan Choudhury, Scientist-'B' (HG), CGWB, ER, Kolkata, gave presentation on the results and computational outcomes of the Ground Water Resource Assessment (GWRA) – 2022 (as on 31.03.2022) and its comparative study with the assessment of 2020. It was informed that all the units assessed were categorized as **Safe,** and that only Chowra Island was categorized under saline category of assessment unit. It was also informed to the Members that computation of resource for 2022, like that of previous assessment, was automated and validated through Integrated Ground Water Resource Estimation System (INGRES), jointly developed by Central Ground Water Board, IIT-Hyderabad and the Vassar Labs, Hyderabad.

Shri Kishore Kshirsagar Lakshman, IAS, Secretary (PWD), A&N Administration & Chairman, SLC GWRA 2022, A&N Islands, enquired the reason for changes in computed results for ground water recharge in 2022 compared to 2020 assessment. The Chairman further enquired about the implications of poor ground water quality area tagging for Chowra Islands and their resultant suggestive suitable interventions for ground water management.

Shri A. Choudhury, Scientist-'B'(HG), CGWB, ER explained the historical data of Chowra Islands is suggestive of its Saline tagging, which has already been documented, endorsed and approved by the previous SLCs and is also reflected in the already published previous reports of the National Level Compilation of Dynamic Ground Water Resource Assessments. Dr. Anadi Gayen, Regional Director(I/C), CGWB, ER informed the august house that currently, NAQUIM studies are being carried out in Nicobar District and some specific suggestions, based on this study will be reflected in the upcoming NAQUIM report.

Minutes of the Meeting of State Level Committee for Assessment of Ground Water Resources of Andaman & Nicobar Islands(as on 31.03.2022), held online on 30.08.2022

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At the end the draft Ground Water Resources of Andaman & Nicobar Islands(As on 31.03.2022) was accepted unanimously and was accorded due approval by the members of the State Level Committee under the Chairmanship of Secretary, Public Works Department, Andaman & Nicobar Administration.

The draft computational figures for Dynamic Ground Water Resources of the Union Territory of Andaman & Nicobar Islands (As on 31.03.2022), as approved and adopted by the SLC are as follows :

S. No	District	Annual Replenishable Recharge (HaM)			Environmental Flow	Annual Extractable Recharge	Annual Ground Water Extraction (HaM)				Stage of GW Extraction	Category
		Recharge from Rainfall	Recharge from Other Sources	Total Recharge	(HaM)	(HaM)	Domestic use	Industrial use	Irrigation use	Gross Extraction	(%)	
1	N & M Andaman	16376.36	12.63	16388.99	1638.9	14750.09	251.33	83.04	0.8	335.17	2.27	Safe
2A	Nicobar(Fresh)	34663.16	1	34664.16	3466.4	31197.75	84.67	0.94	0.25	85.84	0.28	Safe
2B	NicobarPGWQA)	348.40	0.00	348.40	34.84	313.56	3.02	0.00	0.00	3.03	0.97	Saline
3	South AndamanFresh)	10777.26	12.51	10789.77	1078.97	9710.80	309.63	13.54	10.65	333.80	3.44	Safe
	STATE TOTAL(Fresh)	61816.78	26.14	61842.92	6184.28	55658.64	645.63	97.52	11.70	754.81	1.36	**SAFE**
	STATE TOTAL(PGWQA)	348.40	0.00	348.40	34.84	313.56	3.02	0.00	0.00	3.03	0.97	**SALINE**

The meeting ended with a vote of thanks to the chair

NB: In accordance with the suggestion and approval of the Chairman, SLC, GWRA - 2022, the Minutes of the SLC meeting pertaining to approval of GWRA-2022 (A & N Islands), is to be signed by the Member Secretary, SLC, GWRA -2022.

05/09/2022

(Dr. Anadi Gayen)
Regional Director (I/C)
Central Ground Water Board, Eastern Region, Kolkata
& Member Secretary, SLC, GWRA 2022(A & N Islands)

Minutes of the Meeting of State Level Committee for Assessment of Ground Water Resources of Andaman & Nicobar Islands(as on 31.03.2022), held online on 30.08.2022

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ANNEXURE – I

Participant List of the Meeting of State Level Committee for Assessment of Ground Water Resources of Andaman & Nicobar Islands (as on 31.03.2020), held online on 30.08.2022

Sl No	Name	Designation
1.	Shri Kishore Kshirsagar Lakshman, IAS	Secretary(PWD), A&N Administration & Chairman, SLC GWRA 2022, A&N Islands (In the Chair)
2.	Shri M. Sivarama Subramaniam	Chief Engineer, APWD
3.	Er. Arun Kumar	Director(I/C) ANSWSM, A&N Administration
4.	Dr. Anadi Gayen	Regional Director(I/C) CGWB, ER, Kolkata & Member Secretary, SLC
5.	Smt. Sandhya Yadav	Scientist-'E'(HG), CGWB, ER, Kolkata
6.	Dr. Indranil Roy	Scientist-'D'(HG), CGWB, ER, Kolkata
7.	Sri. A. Choudhury	Scientist-'B'(HG), CGWB, ER, Kolkata
8.	Sri P. Yenatapalli	Assistant Chemist, CGWB, ER, Kolkata
9.	Sri Awadhesh Kumar	STA (HG), CGWB, ER, Kolkata

Annexure - I

DYNAMIC GROUND WATER RESOURCES OF INDIA, 2022															
INDIA															
S.NO	District	Ground Water Recharge(HaM)					Total Natural Discharges(HaM)	Annual Extractable Ground Water Resource(HaM)	Current Annual Ground Water Extraction(HaM)				Annual GW Allocation for Domestic use as on 2025(HaM)	Net Ground Water Availability for future use (HaM)	Stage of Ground Water Extraction(%)
		Monsoon Season		Non-Monsoon Season		Total Annual Ground Water Recharge			Irrigation	Industrial	Domestic	Total			
		Recharge from rainfall	Recharge from other Sources	Recharge from Rainfall	Recharge from other Sources										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	ANDAMAN AND NICOBAR ISLANDS	29786.45	20.92	32030.33	5.22	61842.92	6184.28	55658.64	11.704	97.52329673	645.6340825	754.81	694.73	54857.99	1.35
	Total(bcm)	0.2979	0.0002	0.3203	0.0001	0.6184	0.0618	0.5566	0.0001	0.001	0.0065	0.0075	0.0069	0.5486	1.35

Annexure II

DYNAMIC GROUND WATER RESOURCES OF INDIA, 2022															
ANDAMAN AND NICOBAR ISLANDS															
S.NO	State/Union Territories	Ground Water Recharge(HaM)					Total Natural Discharges(HaM)	Annual Extractable Ground Water Resource(HaM)	Current Annual Ground Water Extraction(HaM)				Annual GW Allocation for Domestic use as on 2025(HaM)	Net Ground Water Availability for future use (HaM)	Stage of Ground Water Extraction(%)
		Monsoon Season		Non-Monsoon Season		Total Annual Ground Water Recharge(HaM)			Irrigation	Industrial	Domestic	Total			
		Recharge from rainfall	Recharge from other Sources	Recharge from Rainfall	Recharge from other Sources										
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	N & M ANDAMAN	8894.86	10.11	7481.5	2.52	16388.99	1638.9	14750.09	0.8	83.04	251.33	335.17	269.19	14397.06	2.27
2	NICOBAR	14917.07	0.8	19746.09	0.2	34663.16	3466.41	31197.75	0.25	0.94	87.7	88.87	93.92	31419.46	0.28
3	SOUTH ANDAMAN	5974.52	10.01	4802.74	2.5	10789.77	1078.97	9710.8	10.65	13.54	309.63	333.8	331.62	9355.02	3.44
	Total(Ham)	29786.45	20.92	32030.33	5.22	61841.92	6184.28	55658.64	11.7	97.52	648.66	757.84	694.73	55171.54	1.35
	Total(Bcm)	0.2979	0.0002	0.3203	0.0001	0.6184	0.0618	0.5566	0.0001	0.001	0.0065	0.0076	0.0069	0.5517	1.35

Annexure-3A

CATEGORIZATION OF BLOCKS/ MANDALS/ TALUKAS IN INDIA (2022)												
S.No	States / Union Territories	Total No. of Assessed Units	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Nos.	%	Nos.	%	Nos.	%	Nos.	%	Nos.	%
1	**ANDAMAN AND NICOBAR ISLANDS**	36	35	97.22	-	-	-	-	-	-	1	2.78
	Total States	36	35	97.22	-	-	-	-	-	-	1	2.78
	Grand Total	36	35	97.22	-	-	-	-	-	-	1	2.78

Annexure-3B

DYNAMIC GROUND WATER RESOURCES OF INDIA, 2022												
ANDAMAN AND NICOBAR ISLANDS												
S.No	**Name of District**	**Total No. of Assessed Units**	**Safe**		**Semi-Critical**		**Critical**		**Over-Exploited**		**Saline**	
			No	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
1	**N & M ANDAMAN**	13	13	100.0	-	-	-	-	-	-	-	-
2	**SOUTH ANDAMAN**	10	10	100.0	-	-	-	-	-	-	-	-
3	**NICOBAR**	13	12	92.31	-	-	-	-	-	-	1	7.69
	Total	36	35	97.22	-	-	-	-	-	-	1	2.78

Annexure-3C

ANNUAL EXTRACTABLE RESOURCE OF ASSESSMENT UNITS UNDER DIFFERENT CATEGORIES, 2022												
S.No	State/Union Territories	Total Annual Extractable Resource of Assessed Units (in mcm)	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%
1	**ANDAMAN AND NICOBAR ISLANDS**	559.72	556.59	99.4	-	-	-	-	-	-	3.14	0.56
	Total States	559.72	556.59	99.4	-	-	-	-	-	-	3.14	0.56
	Grand Total	559.72	556.59	99.4	-	-	-	-	-	-	3.14	0.56

Annexure-3D

DYNAMIC GROUND WATER RESOURCES OF INDIA, 2022												
S.No	Name of District	Total Annual Extractable Resource of Assessed Units (in mcm)	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
			Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%	Total Annual Extractable Resource (in mcm)	%
1	**N & M ANDAMAN**	147.50	147.50			-	-	-	-	-	-	-
2	**SOUTH ANDAMAN**	97.11	97.11			-	-	-	-	-		-
3	**NICOBAR**	315.11	311.98			-	-	-	-	-	3.14	0.56
	Total States	559.72	556.59	99.44		-	-	-	-	-	3.14	0.56
	Grand Total	559.72	556.59	99.44		-	-	-	-	-	3.14	0.56

Annexure-3E

AREA OF ASSESSMENT UNITS UNDER DIFFERENT CATEGORIES IN INDIA (2022)													
S.No	States / Union Territories	Total Recharge Worthy Areaof Assessed Units (in sq km)	Recharge Worthy Area (in sq km)	Safe		Semi-Critical		Critical		Over-Exploited		Saline	
				Recharge Worthy Area in sq km	%	Recharge Worthy Area in sq km	%	Recharge Worthy Area in sq km	%	Recharge Worthy Area in sq km	%	Recharge Worthy Area in sq km	%
1	ANDAMAN AND NICOBAR ISLANDS	2120.07	2111.79	99.61	-	-	-	-	-	-	-	8	0.38
	Total States	2120.07	2111.79	99.61	-	-	-	-	-	-	-	8	0.38
	Grand Total	2120.07	2111.79	99.61	-	-	-	-	-	-	-	8	0.38

Annexure-3F

DYNAMIC GROUND WATER RESOURCES OF INDIA, 2022												
ANDAMAN AND NICOBAR ISLANDS												
S.No	**Name of District**	**Total Recharge Worthy Area of Assessed Units (in sq.km)**	**Safe**		**Semi-Critical**		**Critical**		**Over-Exploited**		**Saline**	
			Recharge Worthy Area of Assessed Units (in sq.km)	**%**	**Recharge Worthy Area of Assessed Units (in sq.km)**	**%**	**Recharge Worthy Area of Assessed Units (in sq.km)**	**%**	**Recharge Worthy Area of Assessed Units (in sq.km)**	**%**	**Recharge Worthy Area of Assessed Units (in sq.km)**	**%**
1	**N & M ANDAMAN**	580.4	580.4	100.0	-	-	-	-	-	-	-	-
2	**SOUTH ANDAMAN**	315.24	315.24	100.0	-	-	-	-	-	-	-	-
3	**NICOBAR**	1224.43	1216.15	99.32	-	-	-	-	-	-	8	0.65
	Total	2120.07	2111.79	99.61	-	-	-	-	-	-	8	0.38

Annexure : 4 A

CATEGORISATION OF ASSESSMENT UNIT, 2022							
ANDAMAN AND NICOBAR ISLANDS							
S.NO	Name of District	S.NO	Name of Semi-Critical Assessment Units	S.NO	Name of Critical Assessment Units	S.NO	Name of Over-Exploited Assessment Units

ABSTRACT			
Total No. of Assessed Units	Number of Semicritical Assessment Units	Number of Critical Assessment Units	Number of Over Exploited Assessment Units
36	0	0	0

Annexure : 4 B

QUALITY PROBLEMS IN ASSESSMENT UNITS, 2022							
ANDAMAN AND NICOBAR ISLANDS							
S.NO	**Name of District**	**S.NO**	**Name of Assessment Units affected by Fluoride**	**S.NO**	**Name of Assessment Units affected by Arsenic**	**S.NO**	**Name of Assessment Units affected by Salinity**
1	Nicobar					1	Chowra Islands

ABSTRACT			
Total No. of Assessed Units	**Number of Assessment Units affected by Fluoride**	**Number of Assessment Units affected by Arsenic**	**Number of Assessment Units affected by Salinity**
36	0	0	1

Annexure-5A

State-Wise Summary Of Assessmet Units Improved Or Deteriorated From 2020 To 2022 Assessment				
S.No	**Name of States / Union Territories**	**Number of Assessment Units Improved**	**Number of Assessment Units Deteriorated**	**Number of Assessment Units With No Change**
1	**ANDAMAN AND NICOBAR ISLANDS**	0	0	36

Annexure-5B

COMPARISON OF CATEGORIZATION OF ASSESSMENT UNITS (2020 AND 2022)									
ANDAMAN AND NICOBAR ISLANDS									
S.No	Name of District	Name of Assessment Unit	Stage of Ground Water Extraction (%)2020	Categorization in2020	Name of District	Name of Assessment Unit	Stage of Ground Water Extraction (%)2022	Categorization in2022	Remark
1	N & M ANDAMAN	Aves Island	0.00	Safe	N & M ANDAMAN	Aves Island	0.00	Safe	No Change
2	N & M ANDAMAN	Baratang Island	0.45	Safe	N & M ANDAMAN	Baratang Island	0.81	Safe	No Change
3	N & M ANDAMAN	East Island	0.04	Safe	N & M ANDAMAN	East Island	0.05	Safe	No Change
4	N & M ANDAMAN	Interview Island	0.01	Safe	N & M ANDAMAN	Interview Island	0.00	Safe	No Change
5	N & M ANDAMAN	Long Island	0.76	Safe	N & M ANDAMAN	Long Island	0.83	Safe	No Change
6	N & M ANDAMAN	Middle Andaman	13.27	Safe	N & M ANDAMAN	Middle Andaman	3.94	Safe	No Change
7	N & M ANDAMAN	Narcondam Island	0.10	Safe	N & M ANDAMAN	Narcondam Island	0.03	Safe	No Change
8	N & M ANDAMAN	North Andaman	5.32	Safe	N & M ANDAMAN	North Andaman	2.37	Safe	No Change
9	N & M ANDAMAN	North Passage Island	0.00	Safe	N & M ANDAMAN	North Passage Island	0.00	Safe	No Change
10	N & M ANDAMAN	Porlob Island	0.00	Safe	N & M ANDAMAN	Porlob Island	0.00	Safe	No Change
11	N & M ANDAMAN	Smith Island	1.80	Safe	N & M ANDAMAN	Smith Island	0.49	Safe	No Change
12	N & M ANDAMAN	Stewart Island	0.00	Safe	N & M ANDAMAN	Stewart Island	0.00	Safe	No Change
13	N & M ANDAMAN	Strait Island	0.09	Safe	N & M ANDAMAN	Strait Island	0.14	Safe	No Change
14	NICOBAR	Bampooka Island	0.00	Safe	NICOBAR	Bampooka Island	0.00	Safe	No Change
15	NICOBAR	Car Nicobar Island	1.25	Safe	NICOBAR	Car Nicobar Island	2.02	Safe	No Change
16	NICOBAR	Chowra Island	0.00	Safe	NICOBAR	Chowra Island	0.00	Safe	No Change
17	NICOBAR	Great Nicobar Island	0.23	Safe	NICOBAR	Great Nicobar Island	0.08	Safe	No Change
18	NICOBAR	Kamorta Island	1.66	Safe	NICOBAR	Kamorta Island	0.59	Safe	No Change
19	NICOBAR	Katchal Island	0.82	Safe	NICOBAR	Katchal Island	0.29	Safe	No Change
20	NICOBAR	Kondul Island	0.00	Safe	NICOBAR	Kondul Island	0.00	Safe	No Change
21	NICOBAR	Little Nicobar Island	0.26	Safe	NICOBAR	Little Nicobar Island	0.09	Safe	No Change
22	NICOBAR	Nancowrie Island	2.43	Safe	NICOBAR	Nancowrie Island	0.86	Safe	No Change
23	NICOBAR	Pulo Milo Island	0.61	Safe	NICOBAR	Pulo Milo Island	0.17	Safe	No Change
24	NICOBAR	Teressa Island	6.80	Safe	NICOBAR	Teressa Island	1.95	Safe	No Change
25	NICOBAR	Tillangchang Island	0.03	Safe	NICOBAR	Tillangchang Island	0.04	Safe	No Change
26	NICOBAR	Trinket Island	0.00	Safe	NICOBAR	Trinket Island	0.00	Safe	No Change
27	SOUTH ANDAMAN	Ferrargunj	0.00	Hilly Area	SOUTH ANDAMAN	Ferrargunj	0.00	Hilly Area	No Change
28	SOUTH ANDAMAN	Flatbay Island	0.03	Safe	SOUTH ANDAMAN	Flatbay Island	0.01	Safe	No Change
29	SOUTH ANDAMAN	Havelock Island	3.68	Safe	SOUTH ANDAMAN	Havelock Island	1.09	Safe	No Change
30	SOUTH ANDAMAN	John Lawrence Island	0.00	Safe	SOUTH ANDAMAN	John Lawrence Island	0.00	Safe	No Change
31	SOUTH ANDAMAN	Little Andaman	1.92	Safe	SOUTH ANDAMAN	Little Andaman	2.32	Safe	No Change
32	SOUTH ANDAMAN	Neil Island	5.42	Safe	SOUTH ANDAMAN	Neil Island	1.62	Safe	No Change
33	SOUTH ANDAMAN	North Sentinnel Island	0.04	Safe	SOUTH ANDAMAN	North Sentinnel Island	0.01	Safe	No Change
34	SOUTH ANDAMAN	Peel Island	0.00	Safe	SOUTH ANDAMAN	Peel Island	0.00	Safe	No Change
35	SOUTH ANDAMAN	Port Blair	18.35	Safe	SOUTH ANDAMAN	Port Blair	8.36	Safe	No Change
36	SOUTH ANDAMAN	Rutland Island	0.05	Safe	SOUTH ANDAMAN	Rutland Island	0.04	Safe	No Change
37	SOUTH ANDAMAN	Viper Island	0.00	Safe	SOUTH ANDAMAN	Viper Island	0.00	Safe	No Change

Attribute Table Summary

Count - Assessment Unit Name	Categorization (OE/Critical/Semicritical/Safe)					
State	Over-exploited	Safe	Saline	Critical	Semi-critical	Total Result
Andaman & Nicobar Islands		35	1			36

GWRE 2022 - Andaman Nicobar Islands : ATTRIBUTE TABLE

Sl. No	State	District	Assessment Unit Name	Assessment Unit Type	Total Area of Assessment Unit (Ha)	Recharge Worthy Area(Ha)	Recharge from Rainfall-Monsoon Season	Recharge from Other Sources-Monsoon Season	Recharge from Rainfall-Non Monsoon Season	Recharge from Other Sources-Non Monsoon Season	Total Annual Ground Water (Ham) Recharge	Total Natural Discharges (Ham)	Annual Extractable Ground Water Resource (Ham)	Ground Water Extraction for Irrigation Use (Ham)	Ground Water Extraction for Industrial Use (Ham)	Ground Water Extraction for Domestic Use (Ham)	Total Extraction (Ham)	Annual GW Allocation for for Domestic Use as on 2025 (Ham)	Net Ground Water Availability for future use (Ham)	Stage of Ground Water Extraction (%)	Categorization (Over-ExploitedE/Critical/Semicritical/Safe/Saline)
1	ANDAMAN AND NICOBAR ISLANDS	N & M ANDAMAN	Aves Island	Island	20	16	1.12	0	0.81	0	1.93	0.19	1.74	0	0	0.004015	0	0.01	1.73	0	Safe
2	ANDAMAN AND NICOBAR ISLANDS	N & M ANDAMAN	Baratang Island	Island	29760	8200	1440.9	0.13	1031.97	0.03	2473.03	247.3	2225.73	0	4.501105832	13.534565	18.04	14.5	2206.72	0.810520593	Safe
3	ANDAMAN AND NICOBAR ISLANDS	N & M ANDAMAN	East Island	Island	611	306	53.77	0	38.51	0	92.28	9.23	83.05	0	0	0.0381425	0.04	0.04	83.01	0.048163757	Safe
4	ANDAMAN AND NICOBAR ISLANDS	N & M ANDAMAN	Interview Island	Island	13300	2800	492.02	0	352.38	0	844.4	84.44	759.96	0	0	0.036135	0.03	0.04	759.93	0.003947576	Safe
5	ANDAMAN AND NICOBAR ISLANDS	N & M ANDAMAN	Long Island	Island	1790	1102	232.37	0	208.03	0	440.4	44.04	396.36	0	0.816943584	2.45718	3.28	2.63	392.91	0.827530528	Safe
6	ANDAMAN AND NICOBAR ISLANDS	N & M ANDAMAN	Middle Andaman	Island	153550	18713	2630.6	5.32	2355.03	1.33	4992.28	499.23	4493.05	0.75	44.04291684	132.43076	177.22	141.83	4306.43	3.944313996	Safe
7	ANDAMAN AND NICOBAR ISLANDS	N & M ANDAMAN	Narcondam Island	Island	681	361	76.12	0	54.52	0	130.64	13.06	117.58	0	0	0.0381425	0.04	0.04	117.54	0.034019391	Safe
8	ANDAMAN AND NICOBAR ISLANDS	N & M ANDAMAN	North Andaman	Island	137599	23774	3342.05	4.66	2991.96	1.16	6339.83	633.98	5705.85	0.054	33.67596609	101.2583	134.99	108.45	5563.67	2.365817538	Safe
9	ANDAMAN AND NICOBAR ISLANDS	N & M ANDAMAN	North Passage Island	Island	2196	1006	265.16	0	189.91	0	455.07	45.51	409.56	0	0	0.00803	0.01	0.01	409.55	0.002441645	Safe
10	ANDAMAN AND NICOBAR ISLANDS	N & M ANDAMAN	Porlob Island	Island	845	307	53.95	0	38.64	0	92.59	9.26	83.33	0	0	0	0	0	83.33	0	Safe
11	ANDAMAN AND NICOBAR ISLANDS	N & M ANDAMAN	Smith Island	Island	2470	891	187.88	0	134.56	0	322.44	32.25	290.19	0	0	1.4273325	1.43	1.53	288.66	0.492780592	Safe
12	ANDAMAN AND NICOBAR ISLANDS	N & M ANDAMAN	Stewart Island	Island	723	363	76.54	0	54.82	0	131.36	13.13	118.23	0	0	0.004015	0	0.01	118.22	0	Safe
13	ANDAMAN AND NICOBAR ISLANDS	N & M ANDAMAN	Strait Island	Island	601	201	42.38	0	30.36	0	72.74	7.28	65.46	0	0	0.092345	0.09	0.1	65.36	0.137488543	Safe
	ANDAMAN AND NICOBAR ISLANDS	**N & M ANDAMAN**	**DISTRICT TOTAL(HaM)**	**District**	**344146**	**58040**	**8894.86**	**10.11**	**7481.5**	**2.52**	**16388.99**	**1638.9**	**14750.09**	**0.804**	**83.03693235**	**251.3289625**	**335.17**	**269.19**	**14397.06**	**2.27**	**Safe**
			DISTRICT TOTAL(BCM)		**3.4415**	**0.5804**	**0.0889**	**0.0001**	**0.0748**	**0**	**0.1639**	**0.0164**	**0.1475**	**0**	**0.0008**	**0.0025**	**0.0034**	**0.0027**	**0.144**	**2.27**	**Safe**
14	ANDAMAN AND NICOBAR ISLANDS	NICOBAR	Bampooka Island	Island	1346	506	73.3	0	97.03	0	170.33	17.03	153.3	0	0	0	0	0	153.3	0	Safe
15	ANDAMAN AND NICOBAR ISLANDS	NICOBAR	Car Nicobar Island	Island	12691	7001	1014.19	0.13	1342.51	0.03	2356.86	235.68	2121.18	0.1984	0.1984	42.466655	42.86	45.48	2075.31	2.020573454	Safe
16	ANDAMAN AND NICOBAR ISLANDS	NICOBAR	Chowra Island	Island	828	828	0	0	0	0	0	0	0	0	0	0	0	3.24	0		Salinity
17	ANDAMAN AND NICOBAR ISLANDS	NICOBAR	Great Nicobar Island	Island	104454	94411	11397.3	0.67	15086.88	0.17	26485.02	2648.5	23836.52	0.0294	0.142838356	19.15155	19.32	20.51	23815.84	0.0810521	Safe
18	ANDAMAN AND NICOBAR ISLANDS	NICOBAR	Kamorta Island	Island	18803	6001	724.44	0	958.96	0	1683.4	168.34	1515.06	0.009	0.136131507	8.7787975	8.92	9.4	1505.52	0.588755561	Safe
19	ANDAMAN AND NICOBAR ISLANDS	NICOBAR	Katchal Island	Island	17430	6430	776.23	0	1027.51	0	1803.74	180.37	1623.37	0.006	0.135145205	4.6031975	4.74	4.93	1618.3	0.291985191	Safe
20	ANDAMAN AND NICOBAR ISLANDS	NICOBAR	Kondul Island	Island	466	343	49.69	0	65.77	0	115.46	11.55	103.91	0	0	0	0	0	103.91	0	Safe
21	ANDAMAN AND NICOBAR ISLANDS	NICOBAR	Little Nicobar Island	Island	15902	3102	374.47	0	495.7	0	870.17	87.02	783.15	0	0	0.7166775	0.72	0.77	782.38	0.091936411	Safe
22	ANDAMAN AND NICOBAR ISLANDS	NICOBAR	Nancowrie Island	Island	6682	1182	142.69	0	188.88	0	331.57	33.16	298.41	0.0102	0.136526027	2.42506	2.56	2.6	295.68	0.857880098	Safe
23	ANDAMAN AND NICOBAR ISLANDS	NICOBAR	Pulo Milo Island	Island	129	95	13.76	0	18.22	0	31.98	3.2	28.78	0	0	0.04818	0.05	0.05	28.73	0.173731758	Safe
24	ANDAMAN AND NICOBAR ISLANDS	NICOBAR	Teressa Island	Island	10126	1116	161.67	0	214	0	375.67	37.57	338.1	0	0.194323288	6.39188	6.58	6.84	331.07	1.946169772	Safe
25	ANDAMAN AND NICOBAR ISLANDS	NICOBAR	Tillangchang Island	Island	1683	702	101.69	0	134.62	0	236.31	23.63	212.68	0	0	0.0903375	0.09	0.1	212.58	0.042317096	Safe
26	ANDAMAN AND NICOBAR ISLANDS	NICOBAR	Trinket Island	Island	3626	726	87.64	0	116.01	0	203.65	20.36	183.29	0	0	0	0	0	183.29	0	Safe
	ANDAMAN AND NICOBAR ISLANDS	**NICOBAR**	**DISTRICT TOTAL(HaM)**	**District**	**194166**	**122443**	**14917.07**	**0.8**	**19746.09**	**0.2**	**34664.16**	**3466.41**	**31197.75**	**0.253**	**0.943364384**	**84.672335**	**85.84**	**93.92**	**31105.91**	**0.28**	**Safe**
			DISTRICT TOTAL(BCM)		**1.9417**	**1.2244**	**0.1492**	**0**	**0.1975**	**0**	**0.3466**	**0.0347**	**0.312**	**0**	**0**	**0.0008**	**0.0009**	**0.0009**	**0.3111**	**0.28**	**Safe**
27	ANDAMAN AND NICOBAR ISLANDS	SOUTH ANDAMAN	Ferrargunj	Island	338.81	0	0	0	0	0	0	0	0	0	0	0	-	0	0	-	Hilly Area
28	ANDAMAN AND NICOBAR ISLANDS	SOUTH ANDAMAN	Flatbay Island	Island	936	330	57.99	0.03	41.53	0.01	99.56	9.95	89.61	0	0	0.012045	0.01	0.01	89.6	0.011159469	Safe
29	ANDAMAN AND NICOBAR ISLANDS	SOUTH ANDAMAN	Havelock Island	Island	11393	3833	808.24	0.33	723.57	0.08	1532.22	153.22	1379	0.009	0.009	15.03216	15.05	16.1	1362.88	1.091370558	Safe
30	ANDAMAN AND NICOBAR ISLANDS	SOUTH ANDAMAN	John Lawrence Island	Island	4198	1008	265.69	0	190.29	0	455.98	45.6	410.38	0	0	0	0	0	410.38	0	Safe
31	ANDAMAN AND NICOBAR ISLANDS	SOUTH ANDAMAN	Little Andaman	Island	73439	4790	1262.55	0.8	904.23	0.2	2167.78	216.77	1951.01	0.232	0.232	44.803385	45.27	47.98	1902.56	2.320336646	Safe
32	ANDAMAN AND NICOBAR ISLANDS	SOUTH ANDAMAN	Neil Island	Island	1890	1243	262.1	0.2	234.65	0.05	497	49.7	447.3	0.006	0.006	7.23503	7.24	7.75	439.55	1.618600492	Safe
33	ANDAMAN AND NICOBAR ISLANDS	SOUTH ANDAMAN	North Sentinnel Island	Island	5967	907	159.38	0	114.15	0	273.53	27.36	246.17	0	0	0.036135	0.03	0.04	246.14	0.0121867	Safe
34	ANDAMAN AND NICOBAR ISLANDS	SOUTH ANDAMAN	Peel Island	Island	435	185	32.51	0	23.28	0	55.79	5.58	50.21	0	0	0	0	0	50.21	0	Safe
35	ANDAMAN AND NICOBAR ISLANDS	SOUTH ANDAMAN	Port Blair	Island	134820	13197	1855.18	8.65	1660.84	2.16	3526.83	352.68	3174.15	10.4	13.296	241.6889475	265.38	258.85	2891.61	8.360663485	Safe
36	ANDAMAN AND NICOBAR ISLANDS	SOUTH ANDAMAN	Rutland Island	Island	13717	6007	1266.66	0	907.18	0	2173.84	217.39	1956.45	0	0	0.8250825	0.82	0.89	1955.57	0.041912648	Safe
37	ANDAMAN AND NICOBAR ISLANDS	SOUTH ANDAMAN	Viper Island	Island	50	24	4.22	0	3.02	0	7.24	0.72	6.52	0	0	0	0	0	6.52	0	Safe
	ANDAMAN AND NICOBAR ISLANDS	**SOUTH ANDAMAN**	**DISTRICT TOTAL(HaM)**	**District**	**247183.81**	**31524**	**5974.52**	**10.01**	**4802.74**	**2.5**	**10789.77**	**1078.97**	**9710.8**	**10.647**	**13.543**	**309.632785**	**333.8**	**331.62**	**9355.02**	**3.44**	**Safe**
			DISTRICT TOTAL(BCM)		**2.4718**	**0.3152**	**0.0597**	**0.0001**	**0.048**	**0**	**0.1079**	**0.0108**	**0.0971**	**0.0001**	**0.0001**	**0.0031**	**0.0033**	**0.0033**	**0.0936**	**3.44**	**Safe**
	ANDAMAN AND NICOBAR ISLANDS	**Union Territory**	**UT TOTAL(HaM)**	**Union Territory**	**785495.81**	**212007**	**29786.45**	**20.92**	**32030.33**	**5.22**	**61842.92**	**6184.28**	**55658.64**	**11.704**	**97.52329673**	**645.6340825**	**754.81**	**694.73**	**54857.99**	**1.35**	**Safe**
			UT TOTAL(BCM)		**7.855**	**2.1201**	**0.2979**	**0.0002**	**0.3203**	**0.0001**	**0.6184**	**0.0618**	**0.5566**	**0.0001**	**0.001**	**0.0065**	**0.0075**	**0.0069**	**0.5486**	**1.35**	**Safe**