Daffodil International University

Dhaka, Bangladesh

Thesis Report
On

"Prospect Of Tidal Power Generation At Dublar-Char Of Bangladesh Through tidal barrage Using Low Head Water Turbine"

This thesis has been submitted to the Department of Electrical and Electronic Engineering in partial fulfillment of the requirement for the degree of Bachelor of Science in Electrical and Electronic Engineering.

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January 2020
Certification

This is to certify this thesis entitled **Prospect Of Tidal Power Generation At Dublar-Chor Of Bangladesh Through tidal barrage Using Low Head Water Turbine**" is done by the following students under my direct supervision and this work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering. The presentation of the work was held on January 2020.

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The thesis entitled **"Prospect Of Tidal Power Generation At Dublar-Chor Of Bangladesh Through tidal barrage Using Low Head Water Turbine"** submitted by Md. Tofayel Ahmed ID: 163-33-329, Mohammad Mahedy Hasan ID: 163-33-3695, Session: Fall 2016 has been accepted as satisfactory in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering on January 2020.

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APPROVAL LETTER

This thesis report titled **"Prospect Of Tidal Power Generation At Dublar-Chor Of Bangladesh Through tidal barrage Using Low Head Water Turbine** "submitted by Md. Tofayel Ahmed ID:163-33-329, Mohammad Mahedy Hasan ID: 163-33-3695 to the Department of Electrical & Electronic Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on January, 2020.

Board of Examiners:

DECLARATION

We hereby declare that this thesis is based on the result found by ourselves. The materials of work found by other researchers are mentioned by reference. This thesis is submitted to Daffodil International University for partial fulfillment for the requirement of the degree of B.Sc. in Electrical and Electronics Engineering. This thesis neither in whole nor in part has been previously submitted for any degree.

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List of Abbreviations

MW	Mega-watt
PDF	Probability density function
CAK	Compact axial Kaplan turbine
LPDF	Low Probability density function
HPDF	High Probability density function
DTP	Dynamic Tidal Power

List of Symbols

m	meter
hr	hour
n	Efficiency of turbine
MW	Mega-watt
N	Number of turbine
P	Power
Q	Flow rate of turbine in cubic meter/hour
A	reservoir of area in square meter
h	dischargeable head of water in meter
t	working hour of turbine
η	efficiency of turbine
g	constant for gravity
ρ	saline water density

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ABSTRACT

In this thesis the hydro potential suitable for electrical power generation available in coastal area of Bangladesh is Investigated and developed a model for total possible electrical power generation using tidal barrage and low head water turbine. Tidal power provides a great commitment as a way to generate huge amount of electrical energy in many parts of the world without having any carbon emission or harming environment in any other way. Many developed countries of the world now- a day's moving towards the tidal power. As there are crisis of coastal areas of Bangladesh the tidal power can be used to mitigate the power crisis in those areas. Moreover, the establishment of small hydro power has the potential that can develop the local area. The idea of constructing a barrage of dublar char point is expected to make the best use of tidal energy available in the isolated area to solve the power crisis scenario in the place. This thesis presents the analysis of power generation at dublar char.

CHAPTER 1

INTRODUCTION

1.1 Introduction

Most of the energy resources are concentrated in a limited number of countries. on the contrary, the renewable energy resources are prevailing all over the world. Based on REN21.5 2017 record. Renewables contributes 19.5% to human's international power consumption and 24.5% to their era of power in 2015 and 2016. (Wikipedia). Tidal power is one form of hydropower that converts the oceanic electricity obtained from tidal surge into electrical power. Electricity from tidal surge can be used to update energy which might in any other case be generated via fossil gasoline (coal, oil, herbal gasoline) fired power plants and subsequently the reduction of the emission of greenhouse video games can be completed.

Tidal power is a unique form of hydropower that exploits the majority motions of the tides. Tidal barrage system lure sea water in a massive basin and the water is tired through low head water turbines. In current years, rotor has been advanced which can extract the kinetic strength of undone water currents. Tidal power also known as tidal strength is a shape of hydropower that live shows the strength of tides into useful sorts of energy-specially strength.

1.2 Objective

The first objective is to complete the EEE400 course that is a vital a part of finishing a Bachelor in EEE at DIU. We are analyzing about the feasibility of tidal power. The following list summarizes our plan:

O1.To analyze Tide head range at dublar char

02.To prepare Probability density function

03. To calculated possible power generation capacity

04.To calculated possible energy generation

1.3 Basic concept of pdf model

A details analysis is presented [1]. For converting the tidal energy into the electrical energy. From the paper a clear idea of generated power using tidal upsurge can be obtained. In case of hydro – electric power generation a probability density function (PDF) model of water resource is an essential thing and the development of such PDF model is elaborately discussed [2].

This paper tried to evaluate the possible power from tidal potential available in the coastal area especially in the dublar char in Bangladesh. In the paper Compact axial turbine is used for its low head and better flow rate. The flow rate is more appropriate than other places of the country described in (3). despite using two-way generations, the turbine efficiency and monthly generated power is less compared to the proposed project of (4). dublar char has been selected as a low head point and monthly generation is greater as well as no basin required here as presented in (5).

In this paper a low head turbine with proper PDF modeling has been proposed for reduction of Power crisis in the coastal area. The power can be generated twice a day.

1.4 Methodology

This paper has been six chapter. Chapter one is all about the introduction of the paper. The history of tidal power is presented in chapter 2. In chapter 3 appropriate turbine has been selected along with proposed location and in the next chapter 4 a proper generation modeling has been established. In section 5 monthly power and energy generation capacity has been analyzed.6 at last chapter presented the conclusion of the paper.

CHAPTER 2

HISTORY OF TIDAL POWER

2.1 Types of Tidal Generator

Fig 2.1: Tidal Generator

The world's first commercial-scale and grid-connected tidal stream generator – SeaGen – in Strang ford Lough. The strong wake shows the power in the tidal current. Tidal power can be classified into four generating methods:

- Tidal Stream Generator
- Tidal Barrage
- Dynamic Tidal Power
- Tidal Lagoon

2.1.1Tidal Stream Generator

Tidal circulate turbines make use of the kinetic power of shifting water to strength mills, in a comparable way to wind mills that use wind to electricity turbines. Some tidal turbines may be constructed into the structures of present bridges or are absolutely submersed, hence avoiding issues over effect at the herbal panorama. Land constrictions which include straits or inlets can create excessive velocities at precise sites, which can be captured with the use of mills. These generators can be horizontal, vertical, open, or ducted.

Stream energy may be used at a far better rate than wind turbines because of water being denser than air. Using similar era to wind generators converting electricity in tidal power is much extra efficient. Close to ten mph (about eight.6 knots in nautical terms) ocean tidal current could have an energy output identical or greater than a 90-mph wind pace for the identical size of turbine device [3].

2.1.2 Tidal Barrage

Tidal barrages make use of the ability electricity in the difference in height (or hydraulic head) among high and occasional tides. When using tidal barrages to generate energy, the capability energy from a tide is seized through strategic placement of specialized dams. When the sea degree rises and the tide starts to are available in, the temporary boom in tidal power is channeled right into a big basin behind the dam, keeping a huge amount of capacity energy. With the receding tide, this strength is then transformed into mechanical strength as the water is released through large generators that create electrical electricity via the use of mills. Barrages are basically dams across the whole width of a tidal estuary [3].

2.1.3 Dynamic Tidal Power

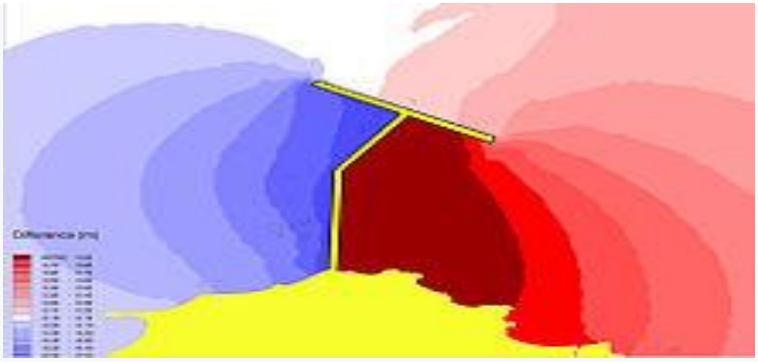

Fig 2.2: Dynamic Tidal Power

Dynamic tidal energy (or DTP) is an untried but promising technology that could take advantage of an interplay among ability and kinetic energies in tidal flows. It proposes that very long dams (as an example: 30–50 km duration) be built from coasts instantly out into the ocean or ocean, without enclosing an area. Tidal section variations are delivered throughout the dam, main to a substantial water-stage differential in shallow coastal seas – offering strong coast-parallel oscillating tidal currents which include determined in the UK, China, and Korea [3].

2.1.4 Tidal Lagoon

A new tidal power design option is to construct circular retaining walls embedded with generators that may seize the capacity energy of tides. The created reservoirs are much like those of tidal barrages, except that the place is synthetic and does no longer include a pre-existing environment. The lagoons can also be in double (or triple) format without pumping or with pumping that will flatten out the energy output. The pumping strength will be provided by extra to grid call for renewable electricity from for example wind mills or sun photovoltaic arrays. Excess renewable power as opposed to being curtailed might be

used and stored for a later time frame. Geographically dispersed tidal lagoons with a time postpone among peak manufacturing would also flatten out height production imparting close to base load manufacturing though at a higher fee than a few other options including district heating renewable electricity garage. The cancelled Tidal Lagoon Swansea Bay in Wales, United Kingdom could have been the primary tidal strength station of this kind once constructed [3].

2.2 US Studies In The Twenty First Century

The Snohomish PUD, a public application district located by and large in Snohomish county, Washington State, commenced a tidal electricity challenge in 2007, in April 2009 the PUD decided on Open Hydro, a company primarily based in Ireland, to develop turbines and system for eventual installation. The assignment as initially designed become to place era equipment in areas of high tidal flow and perform that equipment for four to five years. After the trial period the device would be eliminated. The undertaking turned into first of all budgeted at a total fee of $10 million, with half of of that funding provided via the PUD out of utility reserve finances, and 1/2 from grants, broadly speaking from the USA federal authorities. The PUD paid for a portion of this challenge with reserves and received a $900,000 furnish in 2009 and a $3. Five million grant in 2010 similarly to the use of reserves to pay an estimated $four million of fees. In 2010 the budget estimate changed into improved to $20 million, half to be paid with the aid of the software, 1/2 by means of the federal authorities. The Utility become unable to govern charges on this venture, and by Oct of 2014 the fees had ballooned to an estimated $38 million and have been projected to hold to growth. The PUD proposed that the federal authorities provide a further $10 million in the direction of this accelerated fee citing a "gentleman’s agreement”. When the federal authorities refused to offer the additional funding, the mission was cancelled by means of the PUD after spending nearly $10 million in reserves and grants. The PUD abandoned all tidal power exploration after this mission changed into cancelled and does now not very own or perform any tidal electricity resources [3].

2.3 History of Tidal Power Station

Historically, tide turbines had been used, Europe and America on the Atlantic coast of North America. The incoming water turned into contained in big storage ponds and because the tide went out. It turned waterwheels and convey mechanical energy which is used in mill grain. The earliest occurrences date from the middle a while or even from roman instances. It turned into most effective inside the 19th century that the procedure of using falling water and spinning turbines to create. Electricity has delivered in the U.S and Europe.

2.3.1. La Rance Tidal Power Station

The world first tidal power plant was built in 1966 at la Rance in France which tidal range is 8 meters. It generates 240 MW using 24 low head kapln turbine [3].

Fig 2.3: Top view of La Rance tidal power plant barrage (750m in length)

2.3.2 Sihwa Lake Tidal Power Station

Additionally, Now the world largest tidal power station is sihwa lake tidal power station. This power station built in 2011 and operate 2012 at sihwa lake in south Korea which tidal range is 5.6 meter. It generates 254 MW (megawatt). Using 10 submerged bulb turbines (1).

Fig 2.4: Shiwa Lake Tidal Power Station

CHAPTER 3

PROPOSED TIDAL LOCATION

3.1 Geographically Location of Bangladesh Tidal Energy

Geographically, Bangladesh is situated between 20.30- and 26.38-degree north latitude and 88.04- and 92.44-degree east longitude. Bangladesh is one of the most populated country in the world having 32% coastal area [4]. according to the population census in 2001, some 35 million people live in the coastal region. some coastal area like Sandip, Hiron point, Teknaf,Dublar char, Kutubdia, have tidal potential. Recent studies have suggested that the coastal areas of Bangladesh is ideal places for harvesting tidal electricity from the existing embankments by utilizing small scale appropriate tidal energy technology. Bangladesh can take tidal power generation as a change and can easily overcome its power crisis to some extent.

3.2 Selected Location

For tidal power generation a point shown in Figure 3.1 dublar char which is approximately area of 57.4 km^2. This area has an average high tide of 3.08m with usable tidal head of 1.95m. so there is so much possibility for tidal power generation in the proposed area.

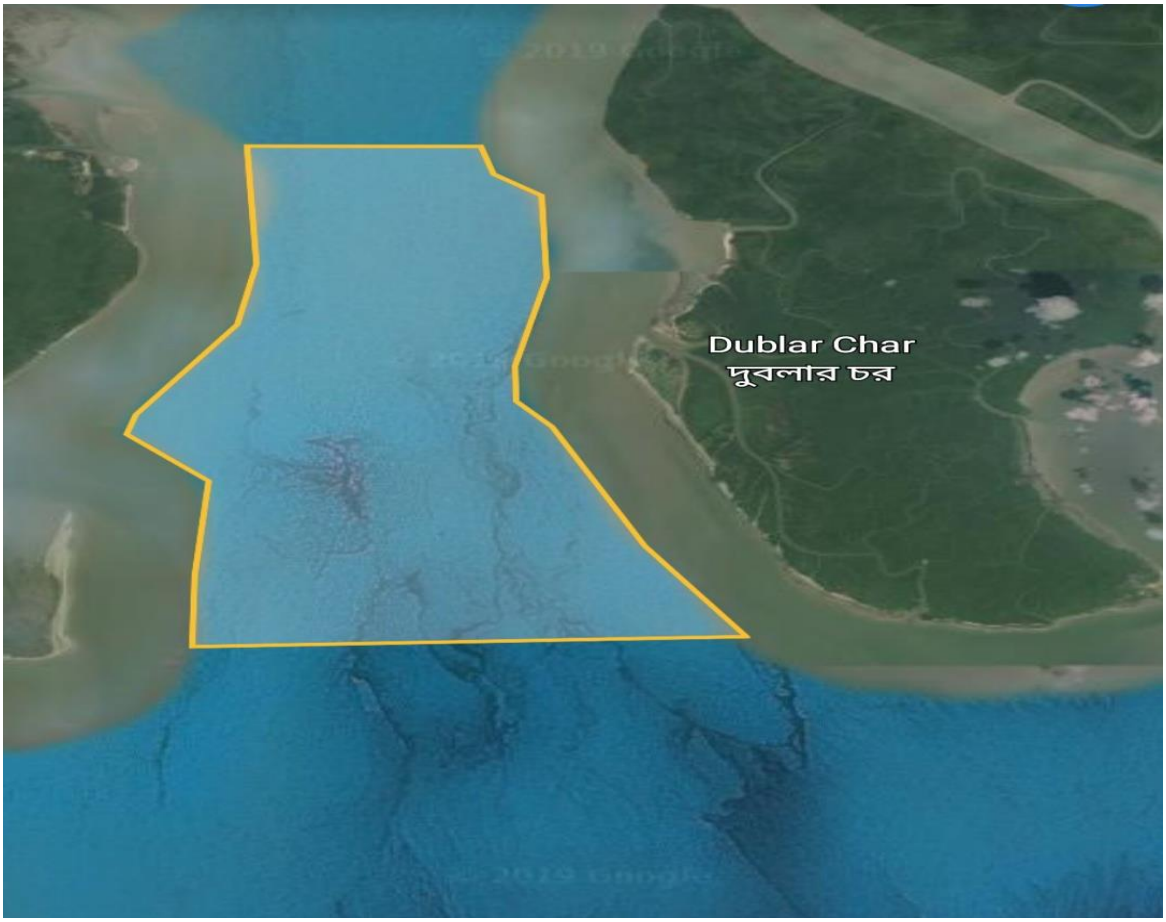

Figure 3.1: Location of Dublar Char

3.3 Tidal Range

We were use tidal range nearly located with our selected area. We ‘re use tidal range of Sundarban [5]. below are given the tidal range of 365 days month by month in 2018:

Table 3.1: Tide range month of January

TIDES4FISHING

SUNDARBAN
January, 2018

DAY			TIDES FOR SUNDARBAN					SOLUNAR ACTIVITY
			1st TIDE	2nd TIDE	3rd TIDE	4th TIDE	COEFFICIENT	
1 Mon		▲ 6:40 h ▼ 17:31 h	3:10 h 0.6 m ▼	8:59 h 2.9 m ▲	15:21 h 0.4 m ▼	21:28 h 3.2 m ▲	100 very high	
2 Tue		▲ 6:41 h ▼ 17:31 h	3:58 h 0.4 m ▼	9:46 h 3.0 m ▲	16:07 h 0.3 m ▼	22:12 h 3.3 m ▲	103 very high	
3 Wed		▲ 6:41 h ▼ 17:32 h	4:43 h 0.4 m ▼	10:31 h 3.1 m ▲	16:52 h 0.3 m ▼	22:55 h 3.3 m ▲	101 very high	
4 Thu		▲ 6:41 h ▼ 17:33 h	5:27 h 0.4 m ▼	11:15 h 3.0 m ▲	17:36 h 0.4 m ▼	23:39 h 3.2 m ▲	95 very high	
5 Fri		▲ 6:41 h ▼ 17:33 h	6:11 h 0.4 m ▼	12:01 h 2.9 m ▲	18:20 h 0.5 m ▼		86 high	
6 Sat		▲ 6:42 h ▼ 17:34 h	0:23 h 3.1 m ▲	6:55 h 0.5 m ▼	12:47 h 2.7 m ▲	19:05 h 0.7 m ▼	75 high	
7 Sun		▲ 6:42 h ▼ 17:35 h	1:08 h 2.9 m ▲	7:40 h 0.7 m ▼	13:37 h 2.6 m ▲	19:52 h 0.9 m ▼	64 average	
8 Mon		▲ 6:42 h ▼ 17:35 h	1:57 h 2.6 m ▲	8:29 h 0.9 m ▼	14:35 h 2.4 m ▲	20:45 h 1.1 m ▼	54 average	
9 Tue		▲ 6:42 h ▼ 17:36 h	2:54 h 2.4 m ▲	9:24 h 1.0 m ▼	15:46 h 2.3 m ▲	21:50 h 1.3 m ▼	48 low	
10 Wed		▲ 6:42 h ▼ 17:37 h	4:06 h 2.3 m ▲	10:30 h 1.2 m ▼	17:09 h 2.2 m ▲	23:14 h 1.4 m ▼	47 low	
11 Thu		▲ 6:42 h ▼ 17:37 h	5:29 h 2.1 m ▲	11:49 h 1.2 m ▼	18:25 h 2.3 m ▲		49 low	
12 Fri		▲ 6:42 h ▼ 17:38 h	0:47 h 1.3 m ▼	6:40 h 2.2 m ▲	13:02 h 1.2 m ▼	19:23 h 2.4 m ▲	54 average	
13 Sat		▲ 6:42 h ▼ 17:39 h	1:54 h 1.2 m ▼	7:36 h 2.3 m ▲	13:57 h 1.0 m ▼	20:09 h 2.5 m ▲	60 average	
14 Sun		▲ 6:43 h ▼ 17:39 h	2:40 h 1.1 m ▼	8:21 h 2.4 m ▲	14:39 h 1.0 m ▼	20:47 h 2.6 m ▲	66 average	
15 Mon		▲ 6:43 h ▼ 17:40 h	3:16 h 1.0 m ▼	8:59 h 2.4 m ▲	15:14 h 0.8 m ▼	21:22 h 2.7 m ▲	72 high	
16 Tue		▲ 6:43 h ▼ 17:41 h	3:48 h 0.8 m ▼	9:34 h 2.6 m ▲	15:47 h 0.7 m ▼	21:54 h 2.9 m ▲	76 high	
17 Wed		▲ 6:42 h ▼ 17:41 h	4:19 h 0.7 m ▼	10:06 h 2.6 m ▲	16:19 h 0.6 m ▼	22:25 h 2.9 m ▲	78 high	
18 Thu		▲ 6:42 h ▼ 17:42 h	4:49 h 0.6 m ▼	10:37 h 2.7 m ▲	16:50 h 0.6 m ▼	22:55 h 2.9 m ▲	79 high	
19 Fri		▲ 6:42 h ▼ 17:43 h	5:19 h 0.6 m ▼	11:08 h 2.7 m ▲	17:22 h 0.6 m ▼	23:25 h 2.9 m ▲	78 high	
20 Sat		▲ 6:42 h ▼ 17:43 h	5:50 h 0.6 m ▼	11:40 h 2.7 m ▲	17:54 h 0.6 m ▼	23:56 h 2.9 m ▲	75 high	
21 Sun		▲ 6:42 h ▼ 17:44 h	6:22 h 0.6 m ▼	12:13 h 2.7 m ▲	18:27 h 0.7 m ▼		71 high	
22 Mon		▲ 6:42 h ▼ 17:45 h	0:29 h 2.8 m ▲	6:56 h 0.7 m ▼	12:50 h 2.6 m ▲	19:04 h 0.8 m ▼	65 average	
23 Tue		▲ 6:42 h ▼ 17:45 h	1:06 h 2.7 m ▲	7:33 h 0.8 m ▼	13:33 h 2.6 m ▲	19:47 h 1.0 m ▼	60 average	
24 Wed		▲ 6:42 h ▼ 17:46 h	1:49 h 2.6 m ▲	8:18 h 0.9 m ▼	14:25 h 2.4 m ▲	20:40 h 1.1 m ▼	55 average	
25 Thu		▲ 6:41 h ▼ 17:47 h	2:43 h 2.4 m ▲	9:13 h 1.0 m ▼	15:35 h 2.3 m ▲	21:50 h 1.2 m ▼	53 average	
26 Fri		▲ 6:41 h ▼ 17:47 h	3:59 h 2.3 m ▲	10:26 h 1.0 m ▼	17:05 h 2.3 m ▲	23:22 h 1.2 m ▼	56 average	
27 Sat		▲ 6:41 h ▼ 17:48 h	5:32 h 2.3 m ▲	11:54 h 1.0 m ▼	18:30 h 2.4 m ▲		64 average	
28 Sun		▲ 6:41 h ▼ 17:49 h	0:57 h 1.1 m ▼	6:54 h 2.4 m ▲	13:17 h 0.9 m ▼	19:36 h 2.7 m ▲	75 high	
29 Mon		▲ 6:40 h ▼ 17:49 h	2:09 h 0.9 m ▼	7:58 h 2.6 m ▲	14:22 h 0.6 m ▼	20:31 h 2.9 m ▲	87 high	
30 Tue		▲ 6:40 h ▼ 17:50 h	3:04 h 0.6 m ▼	8:51 h 2.7 m ▲	15:15 h 0.4 m ▼	21:19 h 3.1 m ▲	97 very high	
31 Wed		▲ 6:40 h ▼ 17:51 h	3:51 h 0.4 m ▼	9:39 h 2.9 m ▲	16:02 h 0.3 m ▼	22:03 h 3.2 m ▲	104 very high	

Table 3.2: Tide range month of February

TIDES4FISHING

SUNDARBAN
February, 2018

DAY		TIDES FOR SUNDARBAN					SOLUNAR ACTIVITY
		1st TIDE	2nd TIDE	3rd TIDE	4th TIDE	COEFFICIENT	
1 Thu	▲ 6:39 h ▼ 17:51 h	4:35 h 0.3 m ▼	10:23 h 3.0 m ▲	16:44 h 0.3 m ▼	22:44 h 3.2 m ▲	105 very high	
2 Fri	▲ 6:39 h ▼ 17:52 h	5:15 h 0.3 m ▼	11:05 h 3.1 m ▲	17:25 h 0.3 m ▼	23:25 h 3.2 m ▲	101 very high	
3 Sat	▲ 6:39 h ▼ 17:53 h	5:54 h 0.3 m ▼	11:46 h 3.0 m ▲	18:04 h 0.4 m ▼		93 very high	
4 Sun	▲ 6:38 h ▼ 17:53 h	0:04 h 3.1 m ▲	6:31 h 0.4 m ▼	12:27 h 2.9 m ▲	18:42 h 0.5 m ▼	82 high	
5 Mon	▲ 6:38 h ▼ 17:54 h	0:43 h 2.9 m ▲	7:08 h 0.5 m ▼	13:08 h 2.7 m ▲	19:20 h 0.7 m ▼	69 average	
6 Tue	▲ 6:37 h ▼ 17:54 h	1:23 h 2.7 m ▲	7:45 h 0.7 m ▼	13:51 h 2.5 m ▲	20:00 h 1.0 m ▼	56 average	
7 Wed	▲ 6:37 h ▼ 17:55 h	2:05 h 2.4 m ▲	8:25 h 1.0 m ▼	14:41 h 2.3 m ▲	20:46 h 1.2 m ▼	45 low	
8 Thu	▲ 6:36 h ▼ 17:56 h	2:55 h 2.2 m ▲	9:12 h 1.2 m ▼	15:49 h 2.1 m ▲	21:48 h 1.3 m ▼	39 low	
9 Fri	▲ 6:36 h ▼ 17:56 h	4:11 h 2.0 m ▲	10:18 h 1.3 m ▼	17:25 h 2.1 m ▲	23:31 h 1.5 m ▼	39 low	
10 Sat	▲ 6:35 h ▼ 17:57 h	5:53 h 2.0 m ▲	11:59 h 1.3 m ▼	18:50 h 2.1 m ▲		44 low	
11 Sun	▲ 6:35 h ▼ 17:57 h	1:26 h 1.3 m ▼	7:12 h 2.0 m ▲	13:30 h 1.2 m ▼	19:49 h 2.3 m ▲	52 average	
12 Mon	▲ 6:34 h ▼ 17:58 h	2:25 h 1.2 m ▼	8:07 h 2.2 m ▲	14:23 h 1.1 m ▼	20:33 h 2.5 m ▲	61 average	
13 Tue	▲ 6:34 h ▼ 17:58 h	3:03 h 1.0 m ▼	8:48 h 2.3 m ▲	15:02 h 0.9 m ▼	21:08 h 2.6 m ▲	70 high	
14 Wed	▲ 6:33 h ▼ 17:59 h	3:34 h 0.8 m ▼	9:22 h 2.5 m ▲	15:35 h 0.7 m ▼	21:40 h 2.8 m ▲	77 high	
15 Thu	▲ 6:32 h ▼ 17:59 h	4:03 h 0.7 m ▼	9:53 h 2.6 m ▲	16:06 h 0.6 m ▼	22:09 h 2.9 m ▲	83 high	
16 Fri	▲ 6:32 h ▼ 18:00 h	4:32 h 0.6 m ▼	10:23 h 2.7 m ▲	16:37 h 0.5 m ▼	22:38 h 3.0 m ▲	87 high	
17 Sat	▲ 6:31 h ▼ 18:00 h	5:01 h 0.4 m ▼	10:52 h 2.9 m ▲	17:07 h 0.4 m ▼	23:07 h 3.0 m ▲	88 high	
18 Sun	▲ 6:30 h ▼ 18:01 h	5:29 h 0.4 m ▼	11:23 h 2.9 m ▲	17:38 h 0.4 m ▼	23:37 h 3.0 m ▲	87 high	
19 Mon	▲ 6:30 h ▼ 18:01 h	5:59 h 0.4 m ▼	11:55 h 2.9 m ▲	18:10 h 0.5 m ▼		83 high	
20 Tue	▲ 6:29 h ▼ 18:02 h	0:09 h 2.9 m ▲	6:30 h 0.5 m ▼	12:30 h 2.9 m ▲	18:44 h 0.6 m ▼	76 high	
21 Wed	▲ 6:28 h ▼ 18:02 h	0:44 h 2.8 m ▲	7:05 h 0.6 m ▼	13:09 h 2.7 m ▲	19:23 h 0.8 m ▼	67 average	
22 Thu	▲ 6:28 h ▼ 18:03 h	1:24 h 2.7 m ▲	7:44 h 0.7 m ▼	13:55 h 2.6 m ▲	20:10 h 1.0 m ▼	58 average	
23 Fri	▲ 6:27 h ▼ 18:03 h	2:12 h 2.4 m ▲	8:34 h 0.9 m ▼	14:55 h 2.4 m ▲	21:14 h 1.2 m ▼	51 average	
24 Sat	▲ 6:26 h ▼ 18:04 h	3:20 h 2.3 m ▲	9:45 h 1.1 m ▼	16:24 h 2.3 m ▲	22:51 h 1.3 m ▼	50 average	
25 Sun	▲ 6:25 h ▼ 18:04 h	5:02 h 2.1 m ▲	11:28 h 1.2 m ▼	18:07 h 2.3 m ▲		58 average	
26 Mon	▲ 6:25 h ▼ 18:05 h	0:45 h 1.2 m ▼	6:42 h 2.3 m ▲	13:09 h 1.0 m ▼	19:25 h 2.6 m ▲	70 high	
27 Tue	▲ 6:24 h ▼ 18:05 h	2:03 h 0.9 m ▼	7:52 h 2.4 m ▲	14:18 h 0.8 m ▼	20:22 h 2.7 m ▲	84 high	
28 Wed	▲ 6:23 h ▼ 18:05 h	2:57 h 0.6 m ▼	8:45 h 2.7 m ▲	15:10 h 0.5 m ▼	21:08 h 3.0 m ▲	96 very high	

Table 3.3: Tide range month of March

TIDES4FISHING

SUNDARBAN
March, 2018

DAY		TIDES FOR SUNDARBAN					SOLUNAR ACTIVITY
		1st TIDE	2nd TIDE	3rd TIDE	4th TIDE	COEFFICIENT	
1 Thu	▲ 6:22 h ▼ 18:06 h	3:41 h 0.4 m ▼	9:30 h 2.9 m ▲	15:53 h 0.4 m ▼	21:50 h 3.1 m ▲	104 very high	
2 Fri	▲ 6:21 h ▼ 18:06 h	4:20 h 0.3 m ▼	10:11 h 3.1 m ▲	16:32 h 0.3 m ▼	22:29 h 3.2 m ▲	106 very high	
3 Sat	▲ 6:21 h ▼ 18:07 h	4:56 h 0.2 m ▼	10:49 h 3.1 m ▲	17:09 h 0.3 m ▼	23:05 h 3.2 m ▲	104 very high	
4 Sun	▲ 6:20 h ▼ 18:07 h	5:30 h 0.3 m ▼	11:25 h 3.1 m ▲	17:43 h 0.3 m ▼	23:40 h 3.1 m ▲	96 very high	
5 Mon	▲ 6:19 h ▼ 18:08 h	6:02 h 0.3 m ▼	12:01 h 3.0 m ▲	18:16 h 0.4 m ▼		85 high	
6 Tue	▲ 6:18 h ▼ 18:08 h	0:15 h 2.9 m ▲	6:33 h 0.4 m ▼	12:36 h 2.9 m ▲	18:48 h 0.6 m ▼	71 high	
7 Wed	▲ 6:17 h ▼ 18:08 h	0:48 h 2.7 m ▲	7:03 h 0.6 m ▼	13:11 h 2.7 m ▲	19:21 h 0.9 m ▼	57 average	
8 Thu	▲ 6:16 h ▼ 18:09 h	1:22 h 2.5 m ▲	7:35 h 0.9 m ▼	13:49 h 2.4 m ▲	19:58 h 1.1 m ▼	45 low	
9 Fri	▲ 6:15 h ▼ 18:09 h	1:59 h 2.3 m ▲	8:13 h 1.1 m ▼	14:36 h 2.3 m ▲	20:46 h 1.3 m ▼	35 low	
10 Sat	▲ 6:15 h ▼ 18:09 h	2:50 h 2.0 m ▲	9:04 h 1.3 m ▼	15:59 h 2.1 m ▲	22:06 h 1.5 m ▼	32 low	
11 Sun	▲ 6:14 h ▼ 18:10 h	4:45 h 1.9 m ▲	10:35 h 1.4 m ▼	18:05 h 2.1 m ▲		37 low	
12 Mon	▲ 6:13 h ▼ 18:10 h	0:36 h 1.5 m ▼	6:45 h 2.0 m ▲	12:50 h 1.4 m ▼	19:22 h 2.2 m ▲	47 low	
13 Tue	▲ 6:12 h ▼ 18:11 h	1:57 h 1.3 m ▼	7:48 h 2.1 m ▲	14:00 h 1.2 m ▼	20:10 h 2.4 m ▲	58 average	
14 Wed	▲ 6:11 h ▼ 18:11 h	2:37 h 1.1 m ▼	8:29 h 2.3 m ▲	14:41 h 1.0 m ▼	20:45 h 2.6 m ▲	69 average	
15 Thu	▲ 6:10 h ▼ 18:11 h	3:08 h 0.8 m ▼	9:02 h 2.5 m ▲	15:14 h 0.8 m ▼	21:16 h 2.7 m ▲	79 high	
16 Fri	▲ 6:09 h ▼ 18:12 h	3:37 h 0.7 m ▼	9:32 h 2.7 m ▲	15:46 h 0.6 m ▼	21:45 h 2.9 m ▲	88 high	
17 Sat	▲ 6:08 h ▼ 18:12 h	4:06 h 0.5 m ▼	10:01 h 2.9 m ▲	16:17 h 0.5 m ▼	22:14 h 3.0 m ▲	94 very high	
18 Sun	▲ 6:07 h ▼ 18:12 h	4:34 h 0.4 m ▼	10:30 h 3.0 m ▲	16:47 h 0.4 m ▼	22:44 h 3.1 m ▲	96 very high	
19 Mon	▲ 6:06 h ▼ 18:13 h	5:04 h 0.3 m ▼	11:02 h 3.1 m ▲	17:19 h 0.4 m ▼	23:15 h 3.1 m ▲	95 very high	
20 Tue	▲ 6:05 h ▼ 18:13 h	5:34 h 0.3 m ▼	11:34 h 3.1 m ▲	17:52 h 0.4 m ▼	23:48 h 3.1 m ▲	90 very high	
21 Wed	▲ 6:05 h ▼ 18:13 h	6:06 h 0.4 m ▼	12:10 h 3.1 m ▲	18:27 h 0.6 m ▼		82 high	
22 Thu	▲ 6:04 h ▼ 18:14 h	0:24 h 2.9 m ▲	6:41 h 0.5 m ▼	12:49 h 2.9 m ▲	19:06 h 0.7 m ▼	70 high	
23 Fri	▲ 6:03 h ▼ 18:14 h	1:04 h 2.7 m ▲	7:21 h 0.7 m ▼	13:34 h 2.7 m ▲	19:53 h 1.0 m ▼	58 average	
24 Sat	▲ 6:02 h ▼ 18:14 h	1:53 h 2.5 m ▲	8:12 h 1.0 m ▼	14:32 h 2.5 m ▲	20:59 h 1.2 m ▼	50 average	
25 Sun	▲ 6:01 h ▼ 18:15 h	3:01 h 2.3 m ▲	9:25 h 1.2 m ▼	16:00 h 2.3 m ▲	22:40 h 1.3 m ▼	49 low	
26 Mon	▲ 6:00 h ▼ 18:15 h	4:51 h 2.1 m ▲	11:18 h 1.2 m ▼	17:52 h 2.3 m ▲		57 average	
27 Tue	▲ 5:59 h ▼ 18:15 h	0:37 h 1.2 m ▼	6:38 h 2.3 m ▲	13:04 h 1.1 m ▼	19:13 h 2.5 m ▲	70 high	
28 Wed	▲ 5:59 h ▼ 18:16 h	1:51 h 1.0 m ▼	7:45 h 2.5 m ▲	14:10 h 0.9 m ▼	20:08 h 2.7 m ▲	83 high	
29 Thu	▲ 5:58 h ▼ 18:16 h	2:42 h 0.7 m ▼	8:34 h 2.7 m ▲	14:58 h 0.6 m ▼	20:53 h 2.9 m ▲	94 very high	
30 Fri	▲ 5:57 h ▼ 18:16 h	3:23 h 0.5 m ▼	9:15 h 2.9 m ▲	15:39 h 0.5 m ▼	21:32 h 3.1 m ▲	101 very high	
31 Sat	▲ 5:56 h ▼ 18:16 h	3:59 h 0.4 m ▼	9:53 h 3.1 m ▲	16:14 h 0.4 m ▼	22:07 h 3.1 m ▲	102 very high	

Table 3.4: Tide range month of April

TIDES4FISHING

SUNDARBAN
April, 2018

DAY		TIDES FOR SUNDARBAN					SOLUNAR ACTIVITY
		1st TIDE	2nd TIDE	3rd TIDE	4th TIDE	COEFFICIENT	
1 Sun	▲ 5:55 h ▼ 18:17 h	4:31 h 0.3 m ▼	10:27 h 3.1 m ▲	16:48 h 0.4 m ▼	22:41 h 3.1 m ▲	100 very high	
2 Mon	▲ 5:54 h ▼ 18:17 h	5:02 h 0.3 m ▼	11:01 h 3.2 m ▲	17:19 h 0.4 m ▼	23:14 h 3.1 m ▲	93 very high	
3 Tue	▲ 5:53 h ▼ 18:17 h	5:31 h 0.4 m ▼	11:33 h 3.1 m ▲	17:49 h 0.5 m ▼	23:46 h 2.9 m ▲	83 high	
4 Wed	▲ 5:53 h ▼ 18:18 h	5:59 h 0.5 m ▼	12:05 h 2.9 m ▲	18:19 h 0.7 m ▼		71 high	
5 Thu	▲ 5:52 h ▼ 18:18 h	0:17 h 2.7 m ▲	6:27 h 0.7 m ▼	12:37 h 2.8 m ▲	18:50 h 0.9 m ▼	58 average	
6 Fri	▲ 5:51 h ▼ 18:18 h	0:48 h 2.6 m ▲	6:57 h 0.9 m ▼	13:10 h 2.6 m ▲	19:25 h 1.1 m ▼	46 low	
7 Sat	▲ 5:50 h ▼ 18:19 h	1:21 h 2.3 m ▲	7:32 h 1.1 m ▼	13:48 h 2.4 m ▲	20:10 h 1.3 m ▼	36 low	
8 Sun	▲ 5:49 h ▼ 18:19 h	2:03 h 2.1 m ▲	8:19 h 1.3 m ▼	14:46 h 2.2 m ▲	21:18 h 1.5 m ▼	32 low	
9 Mon	▲ 5:48 h ▼ 18:19 h	3:25 h 2.0 m ▲	9:37 h 1.5 m ▼	16:51 h 2.1 m ▲	23:12 h 1.5 m ▼	35 low	
10 Tue	▲ 5:47 h ▼ 18:20 h	6:00 h 2.0 m ▲	11:42 h 1.5 m ▼	18:36 h 2.2 m ▲		45 low	
11 Wed	▲ 5:46 h ▼ 18:20 h	0:59 h 1.3 m ▼	7:14 h 2.1 m ▲	13:15 h 1.3 m ▼	19:31 h 2.4 m ▲	56 average	
12 Thu	▲ 5:45 h ▼ 18:20 h	1:52 h 1.2 m ▼	7:57 h 2.4 m ▲	14:05 h 1.1 m ▼	20:10 h 2.6 m ▲	69 average	
13 Fri	▲ 5:45 h ▼ 18:21 h	2:29 h 1.0 m ▼	8:31 h 2.6 m ▲	14:43 h 0.9 m ▼	20:43 h 2.7 m ▲	80 high	
14 Sat	▲ 5:44 h ▼ 18:21 h	3:01 h 0.7 m ▼	9:02 h 2.8 m ▲	15:18 h 0.7 m ▼	21:14 h 2.9 m ▲	90 very high	
15 Sun	▲ 5:43 h ▼ 18:22 h	3:33 h 0.6 m ▼	9:33 h 3.0 m ▲	15:51 h 0.6 m ▼	21:46 h 3.1 m ▲	97 very high	
16 Mon	▲ 5:42 h ▼ 18:22 h	4:04 h 0.4 m ▼	10:05 h 3.2 m ▲	16:25 h 0.4 m ▼	22:19 h 3.1 m ▲	100 very high	
17 Tue	▲ 5:41 h ▼ 18:22 h	4:37 h 0.3 m ▼	10:39 h 3.2 m ▲	16:59 h 0.4 m ▼	22:53 h 3.1 m ▲	99 very high	
18 Wed	▲ 5:40 h ▼ 18:23 h	5:11 h 0.3 m ▼	11:15 h 3.2 m ▲	17:36 h 0.4 m ▼	23:29 h 3.1 m ▲	93 very high	
19 Thu	▲ 5:40 h ▼ 18:23 h	5:46 h 0.4 m ▼	11:52 h 3.2 m ▲	18:14 h 0.6 m ▼		83 high	
20 Fri	▲ 5:39 h ▼ 18:23 h	0:08 h 2.9 m ▲	6:25 h 0.6 m ▼	12:34 h 3.1 m ▲	18:58 h 0.8 m ▼	71 high	
21 Sat	▲ 5:38 h ▼ 18:24 h	0:52 h 2.7 m ▲	7:09 h 0.8 m ▼	13:21 h 2.8 m ▲	19:50 h 1.0 m ▼	59 average	
22 Sun	▲ 5:37 h ▼ 18:24 h	1:45 h 2.5 m ▲	8:04 h 1.0 m ▼	14:21 h 2.6 m ▲	20:59 h 1.2 m ▼	51 average	
23 Mon	▲ 5:36 h ▼ 18:24 h	2:58 h 2.3 m ▲	9:22 h 1.3 m ▼	15:48 h 2.4 m ▲	22:34 h 1.3 m ▼	51 average	
24 Tue	▲ 5:36 h ▼ 18:25 h	4:48 h 2.2 m ▲	11:10 h 1.3 m ▼	17:34 h 2.4 m ▲		59 average	
25 Wed	▲ 5:35 h ▼ 18:25 h	0:16 h 1.2 m ▼	6:26 h 2.3 m ▲	12:47 h 1.2 m ▼	18:52 h 2.6 m ▲	69 average	
26 Thu	▲ 5:34 h ▼ 18:26 h	1:28 h 1.0 m ▼	7:29 h 2.6 m ▲	13:52 h 1.0 m ▼	19:47 h 2.7 m ▲	80 high	
27 Fri	▲ 5:34 h ▼ 18:26 h	2:18 h 0.8 m ▼	8:16 h 2.7 m ▲	14:40 h 0.8 m ▼	20:30 h 2.9 m ▲	88 high	
28 Sat	▲ 5:33 h ▼ 18:26 h	2:58 h 0.6 m ▼	8:55 h 2.9 m ▲	15:19 h 0.7 m ▼	21:08 h 3.0 m ▲	93 very high	
29 Sun	▲ 5:32 h ▼ 18:27 h	3:33 h 0.5 m ▼	9:30 h 3.1 m ▲	15:54 h 0.6 m ▼	21:43 h 3.1 m ▲	94 very high	
30 Mon	▲ 5:31 h ▼ 18:27 h	4:04 h 0.5 m ▼	10:04 h 3.2 m ▲	16:25 h 0.6 m ▼	22:16 h 3.1 m ▲	91 very high	

Table 3.5: Tide range month of May

TIDES4FISHING

SUNDARBAN
May, 2018

DAY		TIDES FOR SUNDARBAN					SOLUNAR ACTIVIT
		1st TIDE	2nd TIDE	3rd TIDE	4th TIDE	COEFFICIENT	
1 Tue	▲ 5:31 h ▼ 18:28 h	4:33 h 0.5 m ▼	10:36 h 3.2 m ▲	16:55 h 0.6 m ▼	22:48 h 3.0 m ▲	86 high	
2 Wed	▲ 5:30 h ▼ 18:28 h	5:01 h 0.6 m ▼	11:07 h 3.1 m ▲	17:25 h 0.7 m ▼	23:19 h 2.9 m ▲	78 high	
3 Thu	▲ 5:30 h ▼ 18:28 h	5:29 h 0.7 m ▼	11:38 h 3.1 m ▲	17:56 h 0.8 m ▼	23:50 h 2.7 m ▲	69 average	
4 Fri	▲ 5:29 h ▼ 18:29 h	5:58 h 0.8 m ▼	12:10 h 2.9 m ▲	18:28 h 1.0 m ▼		59 average	
5 Sat	▲ 5:28 h ▼ 18:29 h	0:22 h 2.6 m ▲	6:30 h 1.0 m ▼	12:43 h 2.7 m ▲	19:05 h 1.1 m ▼	49 low	
6 Sun	▲ 5:28 h ▼ 18:30 h	0:56 h 2.4 m ▲	7:07 h 1.2 m ▼	13:20 h 2.6 m ▲	19:50 h 1.3 m ▼	41 low	
7 Mon	▲ 5:27 h ▼ 18:30 h	1:38 h 2.3 m ▲	7:54 h 1.3 m ▼	14:09 h 2.4 m ▲	20:49 h 1.4 m ▼	36 low	
8 Tue	▲ 5:27 h ▼ 18:30 h	2:43 h 2.1 m ▲	9:02 h 1.5 m ▼	15:30 h 2.3 m ▲	22:10 h 1.5 m ▼	38 low	
9 Wed	▲ 5:26 h ▼ 18:31 h	4:45 h 2.1 m ▲	10:35 h 1.5 m ▼	17:22 h 2.3 m ▲	23:39 h 1.4 m ▼	45 low	
10 Thu	▲ 5:26 h ▼ 18:31 h	6:17 h 2.2 m ▲	12:09 h 1.5 m ▼	18:34 h 2.4 m ▲		55 average	
11 Fri	▲ 5:25 h ▼ 18:32 h	0:48 h 1.2 m ▼	7:10 h 2.4 m ▲	13:15 h 1.3 m ▼	19:22 h 2.6 m ▲	67 average	
12 Sat	▲ 5:25 h ▼ 18:32 h	1:38 h 1.0 m ▼	7:51 h 2.7 m ▲	14:03 h 1.0 m ▼	20:02 h 2.7 m ▲	79 high	
13 Sun	▲ 5:24 h ▼ 18:33 h	2:19 h 0.8 m ▼	8:28 h 2.9 m ▲	14:45 h 0.8 m ▼	20:40 h 2.9 m ▲	89 high	
14 Mon	▲ 5:24 h ▼ 18:33 h	2:57 h 0.6 m ▼	9:04 h 3.1 m ▲	15:24 h 0.7 m ▼	21:17 h 3.1 m ▲	97 very high	
15 Tue	▲ 5:23 h ▼ 18:34 h	3:35 h 0.5 m ▼	9:41 h 3.3 m ▲	16:03 h 0.6 m ▼	21:55 h 3.1 m ▲	100 very high	
16 Wed	▲ 5:23 h ▼ 18:34 h	4:13 h 0.4 m ▼	10:18 h 3.4 m ▲	16:42 h 0.5 m ▼	22:34 h 3.2 m ▲	99 very high	
17 Thu	▲ 5:22 h ▼ 18:34 h	4:52 h 0.4 m ▼	10:58 h 3.4 m ▲	17:24 h 0.6 m ▼	23:15 h 3.1 m ▲	94 very high	
18 Fri	▲ 5:22 h ▼ 18:35 h	5:33 h 0.5 m ▼	11:39 h 3.3 m ▲	18:07 h 0.6 m ▼	23:58 h 3.0 m ▲	85 high	
19 Sat	▲ 5:22 h ▼ 18:35 h	6:17 h 0.7 m ▼	12:24 h 3.2 m ▲	18:55 h 0.8 m ▼		74 high	
20 Sun	▲ 5:21 h ▼ 18:36 h	0:46 h 2.8 m ▲	7:06 h 0.9 m ▼	13:14 h 2.9 m ▲	19:51 h 1.0 m ▼	64 average	
21 Mon	▲ 5:21 h ▼ 18:36 h	1:42 h 2.6 m ▲	8:04 h 1.1 m ▼	14:14 h 2.7 m ▲	20:56 h 1.2 m ▼	57 average	
22 Tue	▲ 5:21 h ▼ 18:37 h	2:56 h 2.4 m ▲	9:17 h 1.3 m ▼	15:33 h 2.6 m ▲	22:16 h 1.2 m ▼	56 average	
23 Wed	▲ 5:20 h ▼ 18:37 h	4:32 h 2.4 m ▲	10:46 h 1.4 m ▼	17:04 h 2.5 m ▲	23:41 h 1.2 m ▼	60 average	
24 Thu	▲ 5:20 h ▼ 18:38 h	6:00 h 2.4 m ▲	12:16 h 1.3 m ▼	18:20 h 2.6 m ▲		66 average	
25 Fri	▲ 5:20 h ▼ 18:38 h	0:52 h 1.1 m ▼	7:03 h 2.6 m ▲	13:25 h 1.2 m ▼	19:18 h 2.7 m ▲	72 high	
26 Sat	▲ 5:20 h ▼ 18:38 h	1:47 h 1.0 m ▼	7:51 h 2.8 m ▲	14:16 h 1.1 m ▼	20:03 h 2.7 m ▲	78 high	
27 Sun	▲ 5:19 h ▼ 18:39 h	2:30 h 0.9 m ▼	8:31 h 2.9 m ▲	14:57 h 1.0 m ▼	20:43 h 2.9 m ▲	81 high	
28 Mon	▲ 5:19 h ▼ 18:39 h	3:06 h 0.8 m ▼	9:07 h 3.1 m ▲	15:33 h 0.9 m ▼	21:19 h 2.9 m ▲	83 high	
29 Tue	▲ 5:19 h ▼ 18:40 h	3:38 h 0.8 m ▼	9:41 h 3.1 m ▲	16:05 h 0.8 m ▼	21:53 h 2.9 m ▲	82 high	
30 Wed	▲ 5:19 h ▼ 18:40 h	4:08 h 0.8 m ▼	10:13 h 3.2 m ▲	16:36 h 0.8 m ▼	22:25 h 2.9 m ▲	79 high	
31 Thu	▲ 5:19 h ▼ 18:41 h	4:37 h 0.8 m ▼	10:45 h 3.1 m ▲	17:07 h 0.9 m ▼	22:57 h 2.9 m ▲	74 high	

Table 3.6: Tide range month of June

TIDES4FISHING

SUNDARBAN

June, 2018

DAY		TIDES FOR SUNDARBAN					SOLUNAR ACTIVI
		1st TIDE	2nd TIDE	3rd TIDE	4th TIDE	COEFFICIENT	
1 Fri	▲ 5:19 h ▼ 18:41 h	5:07 h 0.8 m ▼	11:17 h 3.1 m ▲	17:39 h 0.9 m ▼	23:30 h 2.8 m ▲	68 average	
2 Sat	▲ 5:18 h ▼ 18:41 h	5:39 h 0.9 m ▼	11:49 h 3.0 m ▲	18:13 h 1.0 m ▼		62 average	
3 Sun	▲ 5:18 h ▼ 18:42 h	0:03 h 2.7 m ▲	6:13 h 1.0 m ▼	12:23 h 2.9 m ▲	18:50 h 1.1 m ▼	55 average	
4 Mon	▲ 5:18 h ▼ 18:42 h	0:39 h 2.6 m ▲	6:51 h 1.2 m ▼	13:00 h 2.7 m ▲	19:32 h 1.2 m ▼	48 low	
5 Tue	▲ 5:18 h ▼ 18:43 h	1:21 h 2.4 m ▲	7:36 h 1.3 m ▼	13:43 h 2.6 m ▲	20:22 h 1.3 m ▼	44 low	
6 Wed	▲ 5:18 h ▼ 18:43 h	2:14 h 2.4 m ▲	8:32 h 1.4 m ▼	14:40 h 2.5 m ▲	21:21 h 1.4 m ▼	43 low	
7 Thu	▲ 5:18 h ▼ 18:43 h	3:31 h 2.3 m ▲	9:41 h 1.5 m ▼	15:58 h 2.4 m ▲	22:29 h 1.4 m ▼	47 low	
8 Fri	▲ 5:18 h ▼ 18:44 h	5:02 h 2.4 m ▲	11:00 h 1.5 m ▼	17:21 h 2.4 m ▲	23:39 h 1.3 m ▼	55 average	
9 Sat	▲ 5:18 h ▼ 18:44 h	6:13 h 2.5 m ▲	12:16 h 1.4 m ▼	18:27 h 2.6 m ▲		65 average	
10 Sun	▲ 5:18 h ▼ 18:44 h	0:42 h 1.2 m ▼	7:07 h 2.7 m ▲	13:19 h 1.2 m ▼	19:20 h 2.7 m ▲	75 high	
11 Mon	▲ 5:18 h ▼ 18:45 h	1:36 h 1.0 m ▼	7:53 h 2.9 m ▲	14:12 h 1.0 m ▼	20:07 h 2.9 m ▲	85 high	
12 Tue	▲ 5:18 h ▼ 18:45 h	2:24 h 0.8 m ▼	8:37 h 3.2 m ▲	15:00 h 0.9 m ▼	20:51 h 3.1 m ▲	93 very high	
13 Wed	▲ 5:18 h ▼ 18:45 h	3:10 h 0.6 m ▼	9:19 h 3.4 m ▲	15:45 h 0.7 m ▼	21:35 h 3.1 m ▲	98 very high	
14 Thu	▲ 5:18 h ▼ 18:46 h	3:54 h 0.6 m ▼	10:02 h 3.4 m ▲	16:30 h 0.6 m ▼	22:19 h 3.2 m ▲	99 very high	
15 Fri	▲ 5:19 h ▼ 18:46 h	4:39 h 0.6 m ▼	10:45 h 3.5 m ▲	17:16 h 0.6 m ▼	23:04 h 3.2 m ▲	95 very high	
16 Sat	▲ 5:19 h ▼ 18:46 h	5:24 h 0.6 m ▼	11:29 h 3.4 m ▲	18:02 h 0.7 m ▼	23:50 h 3.1 m ▲	89 high	
17 Sun	▲ 5:19 h ▼ 18:46 h	6:11 h 0.7 m ▼	12:15 h 3.3 m ▲	18:50 h 0.8 m ▼		80 high	
18 Mon	▲ 5:19 h ▼ 18:47 h	0:40 h 2.9 m ▲	7:01 h 0.9 m ▼	13:05 h 3.1 m ▲	19:42 h 0.9 m ▼	71 high	
19 Tue	▲ 5:19 h ▼ 18:47 h	1:35 h 2.8 m ▲	7:55 h 1.1 m ▼	14:00 h 2.9 m ▲	20:38 h 1.1 m ▼	63 average	
20 Wed	▲ 5:19 h ▼ 18:47 h	2:40 h 2.6 m ▲	8:57 h 1.3 m ▼	15:06 h 2.7 m ▲	21:42 h 1.2 m ▼	58 average	
21 Thu	▲ 5:20 h ▼ 18:47 h	3:59 h 2.6 m ▲	10:09 h 1.4 m ▼	16:23 h 2.6 m ▲	22:54 h 1.3 m ▼	57 average	
22 Fri	▲ 5:20 h ▼ 18:48 h	5:21 h 2.6 m ▲	11:32 h 1.5 m ▼	17:40 h 2.6 m ▲		59 average	
23 Sat	▲ 5:20 h ▼ 18:48 h	0:07 h 1.3 m ▼	6:29 h 2.6 m ▲	12:49 h 1.4 m ▼	18:43 h 2.6 m ▲	62 average	
24 Sun	▲ 5:20 h ▼ 18:48 h	1:10 h 1.2 m ▼	7:23 h 2.7 m ▲	13:50 h 1.3 m ▼	19:36 h 2.6 m ▲	66 average	
25 Mon	▲ 5:21 h ▼ 18:48 h	2:00 h 1.2 m ▼	8:08 h 2.9 m ▲	14:37 h 1.2 m ▼	20:19 h 2.7 m ▲	70 high	
26 Tue	▲ 5:21 h ▼ 18:48 h	2:41 h 1.1 m ▼	8:46 h 3.0 m ▲	15:16 h 1.2 m ▼	20:58 h 2.8 m ▲	73 high	
27 Wed	▲ 5:21 h ▼ 18:48 h	3:16 h 1.0 m ▼	9:22 h 3.1 m ▲	15:50 h 1.1 m ▼	21:34 h 2.9 m ▲	75 high	
28 Thu	▲ 5:21 h ▼ 18:49 h	3:49 h 1.0 m ▼	9:56 h 3.1 m ▲	16:22 h 1.0 m ▼	22:08 h 2.9 m ▲	75 high	
29 Fri	▲ 5:22 h ▼ 18:49 h	4:21 h 1.0 m ▼	10:29 h 3.2 m ▲	16:53 h 1.0 m ▼	22:41 h 2.9 m ▲	74 high	
30 Sat	▲ 5:22 h ▼ 18:49 h	4:53 h 1.0 m ▼	11:00 h 3.2 m ▲	17:25 h 1.0 m ▼	23:14 h 2.9 m ▲	71 high	

Table 3.7: Tide range month of July

TIDES4FISHING

SUNDARBAN
July, 2018

DAY		TIDES FOR SUNDARBAN					SOLUNAR ACTIVITY
		1st TIDE	2nd TIDE	3rd TIDE	4th TIDE	COEFFICIENT	
1 Sun	▲ 5:22 h ▼ 18:49 h	5:25 h 1.0 m ▼	11:33 h 3.1 m ▲	17:59 h 1.0 m ▼	23:47 h 2.8 m ▲	67 average	
2 Mon	▲ 5:23 h ▼ 18:49 h	5:59 h 1.0 m ▼	12:05 h 3.1 m ▲	18:33 h 1.1 m ▼		63 average	
3 Tue	▲ 5:23 h ▼ 18:49 h	0:22 h 2.7 m ▲	6:35 h 1.2 m ▼	12:39 h 2.9 m ▲	19:10 h 1.2 m ▼	58 average	
4 Wed	▲ 5:23 h ▼ 18:49 h	1:00 h 2.7 m ▲	7:15 h 1.2 m ▼	13:17 h 2.9 m ▲	19:50 h 1.2 m ▼	54 average	
5 Thu	▲ 5:24 h ▼ 18:49 h	1:44 h 2.6 m ▲	8:00 h 1.3 m ▼	14:01 h 2.7 m ▲	20:37 h 1.3 m ▼	51 average	
6 Fri	▲ 5:24 h ▼ 18:49 h	2:39 h 2.6 m ▲	8:55 h 1.5 m ▼	14:58 h 2.6 m ▲	21:33 h 1.3 m ▼	50 average	
7 Sat	▲ 5:24 h ▼ 18:49 h	3:51 h 2.5 m ▲	10:02 h 1.5 m ▼	16:12 h 2.6 m ▲	22:38 h 1.3 m ▼	54 average	
8 Sun	▲ 5:25 h ▼ 18:49 h	5:13 h 2.6 m ▲	11:20 h 1.5 m ▼	17:32 h 2.6 m ▲	23:49 h 1.3 m ▼	60 average	
9 Mon	▲ 5:25 h ▼ 18:49 h	6:24 h 2.7 m ▲	12:39 h 1.4 m ▼	18:42 h 2.7 m ▲		69 average	
10 Tue	▲ 5:25 h ▼ 18:49 h	0:59 h 1.2 m ▼	7:24 h 2.9 m ▲	13:46 h 1.2 m ▼	19:41 h 2.8 m ▲	79 high	
11 Wed	▲ 5:26 h ▼ 18:48 h	2:00 h 1.0 m ▼	8:16 h 3.2 m ▲	14:43 h 1.0 m ▼	20:33 h 3.0 m ▲	89 high	
12 Thu	▲ 5:26 h ▼ 18:48 h	2:54 h 0.8 m ▼	9:03 h 3.4 m ▲	15:34 h 0.8 m ▼	21:22 h 3.1 m ▲	96 very high	
13 Fri	▲ 5:27 h ▼ 18:48 h	3:43 h 0.7 m ▼	9:49 h 3.5 m ▲	16:21 h 0.7 m ▼	22:09 h 3.2 m ▲	100 very high	
14 Sat	▲ 5:27 h ▼ 18:48 h	4:31 h 0.6 m ▼	10:34 h 3.5 m ▲	17:06 h 0.6 m ▼	22:55 h 3.3 m ▲	100 very high	
15 Sun	▲ 5:27 h ▼ 18:48 h	5:16 h 0.6 m ▼	11:18 h 3.5 m ▲	17:51 h 0.6 m ▼	23:40 h 3.2 m ▲	96 very high	
16 Mon	▲ 5:28 h ▼ 18:48 h	6:02 h 0.7 m ▼	12:03 h 3.4 m ▲	18:35 h 0.7 m ▼		88 high	
17 Tue	▲ 5:28 h ▼ 18:47 h	0:27 h 3.1 m ▲	6:47 h 0.8 m ▼	12:48 h 3.3 m ▲	19:21 h 0.8 m ▼	78 high	
18 Wed	▲ 5:29 h ▼ 18:47 h	1:16 h 3.0 m ▲	7:35 h 1.0 m ▼	13:36 h 3.1 m ▲	20:08 h 1.0 m ▼	67 average	
19 Thu	▲ 5:29 h ▼ 18:47 h	2:10 h 2.8 m ▲	8:25 h 1.3 m ▼	14:29 h 2.9 m ▲	20:59 h 1.2 m ▼	58 average	
20 Fri	▲ 5:29 h ▼ 18:46 h	3:13 h 2.7 m ▲	9:23 h 1.5 m ▼	15:33 h 2.6 m ▲	21:58 h 1.3 m ▼	51 average	
21 Sat	▲ 5:30 h ▼ 18:46 h	4:29 h 2.6 m ▲	10:36 h 1.6 m ▼	16:50 h 2.5 m ▲	23:10 h 1.5 m ▼	49 low	
22 Sun	▲ 5:30 h ▼ 18:46 h	5:48 h 2.6 m ▲	12:05 h 1.7 m ▼	18:07 h 2.5 m ▲		51 average	
23 Mon	▲ 5:31 h ▼ 18:46 h	0:28 h 1.5 m ▼	6:54 h 2.6 m ▲	13:25 h 1.5 m ▼	19:11 h 2.5 m ▲	55 average	
24 Tue	▲ 5:31 h ▼ 18:45 h	1:33 h 1.4 m ▼	7:47 h 2.7 m ▲	14:21 h 1.5 m ▼	20:02 h 2.6 m ▲	61 average	
25 Wed	▲ 5:32 h ▼ 18:45 h	2:23 h 1.3 m ▼	8:30 h 2.9 m ▲	15:03 h 1.3 m ▼	20:44 h 2.7 m ▲	67 average	
26 Thu	▲ 5:32 h ▼ 18:44 h	3:02 h 1.2 m ▼	9:07 h 3.0 m ▲	15:37 h 1.2 m ▼	21:21 h 2.8 m ▲	71 high	
27 Fri	▲ 5:32 h ▼ 18:44 h	3:36 h 1.1 m ▼	9:42 h 3.1 m ▲	16:08 h 1.1 m ▼	21:55 h 2.9 m ▲	75 high	
28 Sat	▲ 5:33 h ▼ 18:43 h	4:08 h 1.0 m ▼	10:14 h 3.2 m ▲	16:38 h 1.0 m ▼	22:27 h 2.9 m ▲	77 high	
29 Sun	▲ 5:33 h ▼ 18:43 h	4:39 h 1.0 m ▼	10:44 h 3.2 m ▲	17:08 h 1.0 m ▼	22:58 h 3.0 m ▲	77 high	
30 Mon	▲ 5:34 h ▼ 18:43 h	5:11 h 1.0 m ▼	11:14 h 3.2 m ▲	17:38 h 1.0 m ▼	23:29 h 3.0 m ▲	76 high	
31 Tue	▲ 5:34 h ▼ 18:42 h	5:42 h 1.0 m ▼	11:44 h 3.2 m ▲	18:09 h 1.0 m ▼		73 high	

Table 3.8: Tide range month of August

TIDES4FISHING

SUNDARBAN

August, 2018

DAY			TIDES FOR SUNDARBAN					SOLUNAR ACTIVITY
			1st TIDE	2nd TIDE	3rd TIDE	4th TIDE	COEFFICIENT	
1 Wed		▲ 5:34 h ▼ 18:42 h	0:01 h 3.0 m ▲	6:15 h 1.0 m ▼	12:15 h 3.1 m ▲	18:41 h 1.0 m ▼	68 average	
2 Thu		▲ 5:35 h ▼ 18:41 h	0:35 h 2.9 m ▲	6:50 h 1.2 m ▼	12:49 h 3.1 m ▲	19:16 h 1.1 m ▼	63 average	
3 Fri		▲ 5:35 h ▼ 18:40 h	1:14 h 2.9 m ▲	7:29 h 1.2 m ▼	13:28 h 2.9 m ▲	19:55 h 1.2 m ▼	57 average	
4 Sat		▲ 5:35 h ▼ 18:40 h	1:59 h 2.8 m ▲	8:15 h 1.3 m ▼	14:15 h 2.7 m ▲	20:44 h 1.3 m ▼	53 average	
5 Sun		▲ 5:36 h ▼ 18:39 h	2:58 h 2.7 m ▲	9:15 h 1.5 m ▼	15:19 h 2.6 m ▲	21:47 h 1.3 m ▼	51 average	
6 Mon		▲ 5:36 h ▼ 18:39 h	4:19 h 2.6 m ▲	10:35 h 1.6 m ▼	16:46 h 2.6 m ▲	23:08 h 1.4 m ▼	55 average	
7 Tue		▲ 5:37 h ▼ 18:38 h	5:48 h 2.7 m ▲	12:10 h 1.5 m ▼	18:15 h 2.6 m ▲		63 average	
8 Wed		▲ 5:37 h ▼ 18:37 h	0:34 h 1.3 m ▼	7:02 h 2.9 m ▲	13:32 h 1.3 m ▼	19:25 h 2.7 m ▲	75 high	
9 Thu		▲ 5:37 h ▼ 18:37 h	1:48 h 1.1 m ▼	8:01 h 3.1 m ▲	14:33 h 1.1 m ▼	20:23 h 3.0 m ▲	87 high	
10 Fri		▲ 5:38 h ▼ 18:36 h	2:46 h 0.9 m ▼	8:52 h 3.3 m ▲	15:24 h 0.9 m ▼	21:12 h 3.2 m ▲	98 very high	
11 Sat		▲ 5:38 h ▼ 18:35 h	3:35 h 0.8 m ▼	9:38 h 3.5 m ▲	16:09 h 0.7 m ▼	21:58 h 3.3 m ▲	104 very high	
12 Sun		▲ 5:38 h ▼ 18:35 h	4:21 h 0.6 m ▼	10:21 h 3.5 m ▲	16:51 h 0.6 m ▼	22:42 h 3.4 m ▲	106 very high	
13 Mon		▲ 5:39 h ▼ 18:34 h	5:04 h 0.6 m ▼	11:03 h 3.6 m ▲	17:32 h 0.6 m ▼	23:24 h 3.4 m ▲	102 very high	
14 Tue		▲ 5:39 h ▼ 18:33 h	5:45 h 0.6 m ▼	11:43 h 3.5 m ▲	18:11 h 0.6 m ▼		93 very high	
15 Wed		▲ 5:40 h ▼ 18:33 h	0:06 h 3.3 m ▲	6:25 h 0.8 m ▼	12:24 h 3.4 m ▲	18:50 h 0.8 m ▼	82 high	
16 Thu		▲ 5:40 h ▼ 18:32 h	0:48 h 3.2 m ▲	7:05 h 1.0 m ▼	13:05 h 3.1 m ▲	19:29 h 1.0 m ▼	68 average	
17 Fri		▲ 5:40 h ▼ 18:31 h	1:33 h 2.9 m ▲	7:47 h 1.2 m ▼	13:48 h 2.9 m ▲	20:11 h 1.2 m ▼	55 average	
18 Sat		▲ 5:41 h ▼ 18:30 h	2:23 h 2.7 m ▲	8:34 h 1.5 m ▼	14:39 h 2.6 m ▲	20:58 h 1.4 m ▼	45 low	
19 Sun		▲ 5:41 h ▼ 18:30 h	3:27 h 2.6 m ▲	9:35 h 1.7 m ▼	15:49 h 2.4 m ▲	22:02 h 1.6 m ▼	40 low	
20 Mon		▲ 5:41 h ▼ 18:29 h	4:56 h 2.4 m ▲	11:08 h 1.8 m ▼	17:28 h 2.3 m ▲	23:36 h 1.7 m ▼	41 low	
21 Tue		▲ 5:41 h ▼ 18:28 h	6:25 h 2.5 m ▲	13:01 h 1.7 m ▼	18:52 h 2.4 m ▲		47 low	
22 Wed		▲ 5:42 h ▼ 18:27 h	1:10 h 1.6 m ▼	7:29 h 2.6 m ▲	14:07 h 1.5 m ▼	19:50 h 2.5 m ▲	56 average	
23 Thu		▲ 5:42 h ▼ 18:26 h	2:08 h 1.4 m ▼	8:15 h 2.8 m ▲	14:47 h 1.4 m ▼	20:32 h 2.7 m ▲	64 average	
24 Fri		▲ 5:42 h ▼ 18:25 h	2:48 h 1.3 m ▼	8:53 h 2.9 m ▲	15:19 h 1.2 m ▼	21:08 h 2.8 m ▲	72 high	
25 Sat		▲ 5:43 h ▼ 18:25 h	3:21 h 1.2 m ▼	9:25 h 3.1 m ▲	15:48 h 1.1 m ▼	21:39 h 2.9 m ▲	78 high	
26 Sun		▲ 5:43 h ▼ 18:24 h	3:52 h 1.0 m ▼	9:55 h 3.2 m ▲	16:16 h 1.0 m ▼	22:09 h 3.1 m ▲	83 high	
27 Mon		▲ 5:43 h ▼ 18:23 h	4:22 h 0.9 m ▼	10:23 h 3.2 m ▲	16:44 h 0.9 m ▼	22:37 h 3.2 m ▲	85 high	
28 Tue		▲ 5:44 h ▼ 18:22 h	4:51 h 0.8 m ▼	10:51 h 3.3 m ▲	17:12 h 0.8 m ▼	23:07 h 3.2 m ▲	85 high	
29 Wed		▲ 5:44 h ▼ 18:21 h	5:21 h 0.8 m ▼	11:19 h 3.3 m ▲	17:41 h 0.8 m ▼	23:37 h 3.2 m ▲	83 high	
30 Thu		▲ 5:44 h ▼ 18:20 h	5:52 h 0.9 m ▼	11:50 h 3.2 m ▲	18:10 h 0.9 m ▼		78 high	
31 Fri		▲ 5:44 h ▼ 18:19 h	0:09 h 3.2 m ▲	6:24 h 1.0 m ▼	12:22 h 3.1 m ▲	18:42 h 1.0 m ▼	70 high	

Table 3.9: Tide range month of September

TIDES4FISHING

SUNDARBAN
September, 2018

DAY		TIDES FOR SUNDARBAN					SOLUNAR ACTIVIT
		1st TIDE	2nd TIDE	3rd TIDE	4th TIDE	COEFFICIENT	
1 Sat	▲ 5:45 h ▼ 18:18 h	0:45 h 3.1 m ▲	7:00 h 1.2 m ▼	12:59 h 3.0 m ▲	19:19 h 1.1 m ▼	62 average	
2 Sun	▲ 5:45 h ▼ 18:17 h	1:27 h 2.9 m ▲	7:44 h 1.3 m ▼	13:43 h 2.8 m ▲	20:05 h 1.2 m ▼	53 average	
3 Mon	▲ 5:45 h ▼ 18:17 h	2:21 h 2.7 m ▲	8:42 h 1.5 m ▼	14:42 h 2.6 m ▲	21:08 h 1.4 m ▼	48 low	
4 Tue	▲ 5:46 h ▼ 18:16 h	3:39 h 2.6 m ▲	10:07 h 1.6 m ▼	16:15 h 2.4 m ▲	22:41 h 1.5 m ▼	51 average	
5 Wed	▲ 5:46 h ▼ 18:15 h	5:23 h 2.6 m ▲	11:57 h 1.5 m ▼	18:03 h 2.5 m ▲		60 average	
6 Thu	▲ 5:46 h ▼ 18:14 h	0:26 h 1.4 m ▼	6:50 h 2.8 m ▲	13:25 h 1.3 m ▼	19:20 h 2.7 m ▲	74 high	
7 Fri	▲ 5:46 h ▼ 18:13 h	1:43 h 1.2 m ▼	7:51 h 3.1 m ▲	14:24 h 1.1 m ▼	20:16 h 3.0 m ▲	88 high	
8 Sat	▲ 5:47 h ▼ 18:12 h	2:39 h 1.0 m ▼	8:40 h 3.2 m ▲	15:11 h 0.8 m ▼	21:03 h 3.2 m ▲	100 very high	
9 Sun	▲ 5:47 h ▼ 18:11 h	3:25 h 0.8 m ▼	9:24 h 3.4 m ▲	15:53 h 0.6 m ▼	21:45 h 3.4 m ▲	107 very high	
10 Mon	▲ 5:47 h ▼ 18:10 h	4:07 h 0.6 m ▼	10:04 h 3.5 m ▲	16:31 h 0.5 m ▼	22:25 h 3.5 m ▲	109 very high	
11 Tue	▲ 5:47 h ▼ 18:09 h	4:46 h 0.6 m ▼	10:42 h 3.5 m ▲	17:07 h 0.5 m ▼	23:03 h 3.5 m ▲	104 very high	
12 Wed	▲ 5:48 h ▼ 18:08 h	5:23 h 0.6 m ▼	11:19 h 3.5 m ▲	17:42 h 0.6 m ▼	23:40 h 3.4 m ▲	95 very high	
13 Thu	▲ 5:48 h ▼ 18:07 h	5:58 h 0.8 m ▼	11:55 h 3.3 m ▲	18:15 h 0.8 m ▼		82 high	
14 Fri	▲ 5:48 h ▼ 18:06 h	0:17 h 3.2 m ▲	6:33 h 1.0 m ▼	12:31 h 3.1 m ▲	18:48 h 1.0 m ▼	67 average	
15 Sat	▲ 5:48 h ▼ 18:05 h	0:54 h 3.1 m ▲	7:09 h 1.2 m ▼	13:08 h 2.9 m ▲	19:23 h 1.2 m ▼	53 average	
16 Sun	▲ 5:49 h ▼ 18:04 h	1:34 h 2.8 m ▲	7:49 h 1.4 m ▼	13:48 h 2.6 m ▲	20:02 h 1.4 m ▼	41 low	
17 Mon	▲ 5:49 h ▼ 18:03 h	2:24 h 2.6 m ▲	8:40 h 1.6 m ▼	14:44 h 2.4 m ▲	20:57 h 1.6 m ▼	34 low	
18 Tue	▲ 5:49 h ▼ 18:02 h	3:47 h 2.4 m ▲	10:04 h 1.8 m ▼	16:38 h 2.2 m ▲	22:31 h 1.7 m ▼	35 low	
19 Wed	▲ 5:50 h ▼ 18:01 h	5:49 h 2.4 m ▲	12:23 h 1.7 m ▼	18:33 h 2.3 m ▲		42 low	
20 Thu	▲ 5:50 h ▼ 18:00 h	0:39 h 1.7 m ▼	7:06 h 2.5 m ▲	13:41 h 1.6 m ▼	19:34 h 2.4 m ▲	53 average	
21 Fri	▲ 5:50 h ▼ 17:59 h	1:46 h 1.5 m ▼	7:54 h 2.7 m ▲	14:21 h 1.3 m ▼	20:15 h 2.6 m ▲	63 average	
22 Sat	▲ 5:50 h ▼ 17:58 h	2:26 h 1.3 m ▼	8:30 h 2.9 m ▲	14:52 h 1.2 m ▼	20:47 h 2.8 m ▲	73 high	
23 Sun	▲ 5:51 h ▼ 17:57 h	2:59 h 1.1 m ▼	9:01 h 3.0 m ▲	15:20 h 1.0 m ▼	21:17 h 3.0 m ▲	82 high	
24 Mon	▲ 5:51 h ▼ 17:56 h	3:29 h 1.0 m ▼	9:29 h 3.1 m ▲	15:47 h 0.8 m ▼	21:45 h 3.1 m ▲	88 high	
25 Tue	▲ 5:51 h ▼ 17:55 h	3:58 h 0.8 m ▼	9:57 h 3.2 m ▲	16:15 h 0.8 m ▼	22:13 h 3.2 m ▲	92 very high	
26 Wed	▲ 5:51 h ▼ 17:54 h	4:28 h 0.8 m ▼	10:25 h 3.3 m ▲	16:42 h 0.7 m ▼	22:42 h 3.3 m ▲	93 very high	
27 Thu	▲ 5:52 h ▼ 17:53 h	4:58 h 0.8 m ▼	10:54 h 3.3 m ▲	17:11 h 0.7 m ▼	23:13 h 3.4 m ▲	90 very high	
28 Fri	▲ 5:52 h ▼ 17:52 h	5:29 h 0.8 m ▼	11:25 h 3.2 m ▲	17:42 h 0.7 m ▼	23:45 h 3.3 m ▲	84 high	
29 Sat	▲ 5:52 h ▼ 17:52 h	6:02 h 0.9 m ▼	11:59 h 3.2 m ▲	18:14 h 0.8 m ▼		74 high	
30 Sun	▲ 5:53 h ▼ 17:51 h	0:22 h 3.2 m ▲	6:39 h 1.0 m ▼	12:37 h 3.0 m ▲	18:52 h 1.0 m ▼	63 average	

Table 3.10: Tide range month of October

TIDES4FISHING

SUNDARBAN
October, 2018

DAY		TIDES FOR SUNDARBAN					SOLUNAR ACTIVITY
		1st TIDE	2nd TIDE	3rd TIDE	4th TIDE	COEFFICIENT	
1 Mon	▲ 5:53 h ▼ 17:50 h	1:04 h 3.0 m ▲	7:24 h 1.2 m ▼	13:22 h 2.7 m ▲	19:39 h 1.2 m ▼	53 average	
2 Tue	▲ 5:53 h ▼ 17:49 h	1:57 h 2.8 m ▲	8:25 h 1.4 m ▼	14:23 h 2.5 m ▲	20:47 h 1.4 m ▼	47 low	
3 Wed	▲ 5:53 h ▼ 17:48 h	3:14 h 2.6 m ▲	9:56 h 1.5 m ▼	16:03 h 2.4 m ▲	22:31 h 1.5 m ▼	50 average	
4 Thu	▲ 5:54 h ▼ 17:47 h	5:07 h 2.6 m ▲	11:51 h 1.5 m ▼	18:00 h 2.4 m ▲		61 average	
5 Fri	▲ 5:54 h ▼ 17:46 h	0:22 h 1.4 m ▼	6:38 h 2.7 m ▲	13:14 h 1.2 m ▼	19:14 h 2.7 m ▲	75 high	
6 Sat	▲ 5:54 h ▼ 17:45 h	1:36 h 1.2 m ▼	7:38 h 2.9 m ▲	14:09 h 1.0 m ▼	20:06 h 2.9 m ▲	89 high	
7 Sun	▲ 5:55 h ▼ 17:44 h	2:28 h 1.0 m ▼	8:25 h 3.2 m ▲	14:53 h 0.8 m ▼	20:49 h 3.2 m ▲	100 very high	
8 Mon	▲ 5:55 h ▼ 17:43 h	3:11 h 0.8 m ▼	9:06 h 3.3 m ▲	15:32 h 0.6 m ▼	21:28 h 3.4 m ▲	105 very high	
9 Tue	▲ 5:55 h ▼ 17:42 h	3:50 h 0.6 m ▼	9:43 h 3.4 m ▲	16:07 h 0.5 m ▼	22:04 h 3.4 m ▲	106 very high	
10 Wed	▲ 5:56 h ▼ 17:41 h	4:26 h 0.6 m ▼	10:19 h 3.4 m ▲	16:40 h 0.5 m ▼	22:39 h 3.4 m ▲	101 very high	
11 Thu	▲ 5:56 h ▼ 17:41 h	4:59 h 0.6 m ▼	10:53 h 3.4 m ▲	17:11 h 0.6 m ▼	23:14 h 3.4 m ▲	91 very high	
12 Fri	▲ 5:56 h ▼ 17:40 h	5:32 h 0.7 m ▼	11:27 h 3.2 m ▲	17:41 h 0.7 m ▼	23:47 h 3.2 m ▲	79 high	
13 Sat	▲ 5:57 h ▼ 17:39 h	6:04 h 0.9 m ▼	12:00 h 3.0 m ▲	18:11 h 0.9 m ▼		66 average	
14 Sun	▲ 5:57 h ▼ 17:38 h	0:21 h 3.1 m ▲	6:37 h 1.1 m ▼	12:33 h 2.8 m ▲	18:42 h 1.1 m ▼	52 average	
15 Mon	▲ 5:57 h ▼ 17:37 h	0:56 h 2.8 m ▲	7:14 h 1.3 m ▼	13:09 h 2.6 m ▲	19:18 h 1.3 m ▼	40 low	
16 Tue	▲ 5:58 h ▼ 17:36 h	1:36 h 2.6 m ▲	8:01 h 1.5 m ▼	13:54 h 2.3 m ▲	20:08 h 1.5 m ▼	33 low	
17 Wed	▲ 5:58 h ▼ 17:36 h	2:36 h 2.4 m ▲	9:12 h 1.7 m ▼	15:26 h 2.1 m ▲	21:30 h 1.7 m ▼	33 low	
18 Thu	▲ 5:59 h ▼ 17:35 h	4:43 h 2.3 m ▲	11:08 h 1.7 m ▼	17:56 h 2.1 m ▲	23:37 h 1.7 m ▼	40 low	
19 Fri	▲ 5:59 h ▼ 17:34 h	6:25 h 2.4 m ▲	12:48 h 1.5 m ▼	19:04 h 2.3 m ▲		50 average	
20 Sat	▲ 6:00 h ▼ 17:33 h	1:04 h 1.5 m ▼	7:19 h 2.5 m ▲	13:38 h 1.3 m ▼	19:46 h 2.6 m ▲	62 average	
21 Sun	▲ 6:00 h ▼ 17:33 h	1:52 h 1.3 m ▼	7:57 h 2.7 m ▲	14:13 h 1.2 m ▼	20:18 h 2.7 m ▲	73 high	
22 Mon	▲ 6:01 h ▼ 17:32 h	2:28 h 1.1 m ▼	8:28 h 2.9 m ▲	14:44 h 1.0 m ▼	20:48 h 3.0 m ▲	83 high	
23 Tue	▲ 6:01 h ▼ 17:31 h	3:00 h 0.9 m ▼	8:58 h 3.1 m ▲	15:14 h 0.8 m ▼	21:17 h 3.1 m ▲	91 very high	
24 Wed	▲ 6:01 h ▼ 17:30 h	3:32 h 0.8 m ▼	9:28 h 3.1 m ▲	15:44 h 0.6 m ▼	21:47 h 3.3 m ▲	95 very high	
25 Thu	▲ 6:02 h ▼ 17:30 h	4:04 h 0.7 m ▼	9:58 h 3.2 m ▲	16:14 h 0.6 m ▼	22:18 h 3.4 m ▲	97 very high	
26 Fri	▲ 6:02 h ▼ 17:29 h	4:37 h 0.6 m ▼	10:31 h 3.2 m ▲	16:46 h 0.6 m ▼	22:51 h 3.4 m ▲	94 very high	
27 Sat	▲ 6:03 h ▼ 17:28 h	5:11 h 0.6 m ▼	11:05 h 3.2 m ▲	17:19 h 0.6 m ▼	23:27 h 3.4 m ▲	87 high	
28 Sun	▲ 6:03 h ▼ 17:28 h	5:48 h 0.8 m ▼	11:42 h 3.1 m ▲	17:56 h 0.7 m ▼		76 high	
29 Mon	▲ 6:04 h ▼ 17:27 h	0:06 h 3.2 m ▲	6:29 h 0.9 m ▼	12:23 h 2.9 m ▲	18:38 h 0.9 m ▼	65 average	
30 Tue	▲ 6:04 h ▼ 17:27 h	0:50 h 3.0 m ▲	7:18 h 1.1 m ▼	13:11 h 2.7 m ▲	19:29 h 1.2 m ▼	54 average	
31 Wed	▲ 6:05 h ▼ 17:26 h	1:44 h 2.7 m ▲	8:22 h 1.3 m ▼	14:17 h 2.4 m ▲	20:41 h 1.3 m ▼	49 low	

Table 3.11: Tide range month of November

TIDES4FISHING

SUNDARBAN

November, 2018

DAY			TIDES FOR SUNDARBAN					SOLUNAR ACTIVITY
			1st TIDE	2nd TIDE	3rd TIDE	4th TIDE	COEFFICIENT	
1 Thu		▲ 6:05 h ▼ 17:25 h	3:01 h 2.6 m ▲	9:51 h 1.4 m ▼	15:58 h 2.3 m ▲	22:23 h 1.5 m ▼	53 average	
2 Fri		▲ 6:06 h ▼ 17:25 h	4:48 h 2.5 m ▲	11:32 h 1.3 m ▼	17:48 h 2.4 m ▲		63 average	
3 Sat		▲ 6:06 h ▼ 17:24 h	0:06 h 1.3 m ▼	6:17 h 2.6 m ▲	12:52 h 1.2 m ▼	19:00 h 2.6 m ▲	75 high	
4 Sun		▲ 6:07 h ▼ 17:24 h	1:19 h 1.2 m ▼	7:17 h 2.8 m ▲	13:47 h 0.9 m ▼	19:50 h 2.9 m ▲	85 high	
5 Mon		▲ 6:07 h ▼ 17:23 h	2:12 h 1.0 m ▼	8:04 h 2.9 m ▲	14:31 h 0.7 m ▼	20:31 h 3.1 m ▲	93 very high	
6 Tue		▲ 6:08 h ▼ 17:23 h	2:54 h 0.8 m ▼	8:45 h 3.1 m ▲	15:09 h 0.6 m ▼	21:09 h 3.2 m ▲	97 very high	
7 Wed		▲ 6:09 h ▼ 17:22 h	3:32 h 0.7 m ▼	9:22 h 3.2 m ▲	15:43 h 0.5 m ▼	21:44 h 3.3 m ▲	97 very high	
8 Thu		▲ 6:09 h ▼ 17:22 h	4:06 h 0.6 m ▼	9:56 h 3.2 m ▲	16:15 h 0.6 m ▼	22:17 h 3.3 m ▲	93 very high	
9 Fri		▲ 6:10 h ▼ 17:22 h	4:39 h 0.6 m ▼	10:30 h 3.1 m ▲	16:44 h 0.6 m ▼	22:50 h 3.2 m ▲	85 high	
10 Sat		▲ 6:10 h ▼ 17:21 h	5:10 h 0.7 m ▼	11:03 h 3.0 m ▲	17:13 h 0.7 m ▼	23:22 h 3.2 m ▲	76 high	
11 Sun		▲ 6:11 h ▼ 17:21 h	5:41 h 0.8 m ▼	11:35 h 2.9 m ▲	17:43 h 0.8 m ▼	23:55 h 3.0 m ▲	65 average	
12 Mon		▲ 6:11 h ▼ 17:20 h	6:14 h 1.0 m ▼	12:08 h 2.7 m ▲	18:15 h 1.0 m ▼		54 average	
13 Tue		▲ 6:12 h ▼ 17:20 h	0:29 h 2.8 m ▲	6:51 h 1.2 m ▼	12:43 h 2.5 m ▲	18:51 h 1.2 m ▼	44 low	
14 Wed		▲ 6:13 h ▼ 17:20 h	1:06 h 2.6 m ▲	7:35 h 1.3 m ▼	13:25 h 2.3 m ▲	19:37 h 1.3 m ▼	37 low	
15 Thu		▲ 6:13 h ▼ 17:20 h	1:53 h 2.4 m ▲	8:34 h 1.5 m ▼	14:28 h 2.1 m ▲	20:44 h 1.5 m ▼	35 low	
16 Fri		▲ 6:14 h ▼ 17:19 h	3:10 h 2.3 m ▲	9:53 h 1.5 m ▼	16:32 h 2.1 m ▲	22:17 h 1.6 m ▼	39 low	
17 Sat		▲ 6:15 h ▼ 17:19 h	5:07 h 2.3 m ▲	11:23 h 1.5 m ▼	18:08 h 2.2 m ▲	23:53 h 1.5 m ▼	48 low	
18 Sun		▲ 6:15 h ▼ 17:19 h	6:22 h 2.3 m ▲	12:34 h 1.3 m ▼	19:01 h 2.4 m ▲		58 average	
19 Mon		▲ 6:16 h ▼ 17:19 h	1:01 h 1.3 m ▼	7:11 h 2.5 m ▲	13:23 h 1.1 m ▼	19:40 h 2.6 m ▲	70 high	
20 Tue		▲ 6:16 h ▼ 17:18 h	1:49 h 1.2 m ▼	7:49 h 2.7 m ▲	14:02 h 0.9 m ▼	20:15 h 2.9 m ▲	80 high	
21 Wed		▲ 6:17 h ▼ 17:18 h	2:29 h 1.0 m ▼	8:25 h 2.8 m ▲	14:39 h 0.7 m ▼	20:48 h 3.1 m ▲	89 high	
22 Thu		▲ 6:18 h ▼ 17:18 h	3:06 h 0.8 m ▼	8:59 h 3.0 m ▲	15:15 h 0.6 m ▼	21:22 h 3.2 m ▲	95 very high	
23 Fri		▲ 6:18 h ▼ 17:18 h	3:43 h 0.6 m ▼	9:35 h 3.1 m ▲	15:51 h 0.5 m ▼	21:58 h 3.3 m ▲	97 very high	
24 Sat		▲ 6:19 h ▼ 17:18 h	4:20 h 0.6 m ▼	10:12 h 3.1 m ▲	16:28 h 0.4 m ▼	22:35 h 3.4 m ▲	95 very high	
25 Sun		▲ 6:20 h ▼ 17:18 h	4:59 h 0.6 m ▼	10:50 h 3.1 m ▲	17:07 h 0.5 m ▼	23:14 h 3.3 m ▲	89 high	
26 Mon		▲ 6:20 h ▼ 17:18 h	5:41 h 0.6 m ▼	11:31 h 3.0 m ▲	17:48 h 0.6 m ▼	23:56 h 3.2 m ▲	81 high	
27 Tue		▲ 6:21 h ▼ 17:18 h	6:26 h 0.7 m ▼	12:17 h 2.9 m ▲	18:34 h 0.8 m ▼		70 high	
28 Wed		▲ 6:22 h ▼ 17:18 h	0:43 h 3.0 m ▲	7:17 h 0.9 m ▼	13:08 h 2.7 m ▲	19:28 h 1.0 m ▼	61 average	
29 Thu		▲ 6:22 h ▼ 17:18 h	1:37 h 2.8 m ▲	8:18 h 1.0 m ▼	14:13 h 2.4 m ▲	20:35 h 1.2 m ▼	56 average	
30 Fri		▲ 6:23 h ▼ 17:18 h	2:46 h 2.6 m ▲	9:32 h 1.2 m ▼	15:41 h 2.3 m ▲	22:00 h 1.3 m ▼	56 average	

Table 3.12: Tide range month of December

TIDES4FISHING

SUNDARBAN

December, 2018

DAY			TIDES FOR SUNDARBAN					SOLUNAR ACTIVITY
			1st TIDE	2nd TIDE	3rd TIDE	4th TIDE	COEFFICIENT	
1 Sat		▲ 6:24 h ▼ 17:18 h	4:16 h 2.4 m ▲	10:57 h 1.2 m ▼	17:19 h 2.4 m ▲	23:34 h 1.3 m ▼	61 average	
2 Sun		▲ 6:24 h ▼ 17:18 h	5:43 h 2.5 m ▲	12:17 h 1.1 m ▼	18:34 h 2.5 m ▲		69 average	
3 Mon		▲ 6:25 h ▼ 17:18 h	0:53 h 1.2 m ▼	6:50 h 2.6 m ▲	13:19 h 0.9 m ▼	19:28 h 2.7 m ▲	75 high	
4 Tue		▲ 6:26 h ▼ 17:18 h	1:52 h 1.0 m ▼	7:41 h 2.7 m ▲	14:07 h 0.8 m ▼	20:11 h 2.9 m ▲	81 high	
5 Wed		▲ 6:26 h ▼ 17:19 h	2:38 h 0.9 m ▼	8:23 h 2.7 m ▲	14:48 h 0.7 m ▼	20:50 h 3.0 m ▲	84 high	
6 Thu		▲ 6:27 h ▼ 17:19 h	3:17 h 0.8 m ▼	9:02 h 2.9 m ▲	15:23 h 0.6 m ▼	21:25 h 3.1 m ▲	85 high	
7 Fri		▲ 6:28 h ▼ 17:19 h	3:52 h 0.7 m ▼	9:38 h 2.9 m ▲	15:55 h 0.6 m ▼	21:59 h 3.1 m ▲	84 high	
8 Sat		▲ 6:28 h ▼ 17:19 h	4:24 h 0.7 m ▼	10:11 h 2.9 m ▲	16:25 h 0.6 m ▼	22:32 h 3.1 m ▲	80 high	
9 Sun		▲ 6:29 h ▼ 17:20 h	4:55 h 0.7 m ▼	10:45 h 2.8 m ▲	16:55 h 0.7 m ▼	23:04 h 3.1 m ▲	75 high	
10 Mon		▲ 6:29 h ▼ 17:20 h	5:27 h 0.8 m ▼	11:18 h 2.7 m ▲	17:26 h 0.8 m ▼	23:37 h 2.9 m ▲	68 average	
11 Tue		▲ 6:30 h ▼ 17:20 h	6:00 h 0.8 m ▼	11:51 h 2.6 m ▲	17:59 h 0.9 m ▼		60 average	
12 Wed		▲ 6:31 h ▼ 17:20 h	0:10 h 2.8 m ▲	6:35 h 1.0 m ▼	12:26 h 2.5 m ▲	18:35 h 1.0 m ▼	53 average	
13 Thu		▲ 6:31 h ▼ 17:21 h	0:45 h 2.7 m ▲	7:14 h 1.0 m ▼	13:04 h 2.4 m ▲	19:16 h 1.2 m ▼	46 low	
14 Fri		▲ 6:32 h ▼ 17:21 h	1:24 h 2.5 m ▲	8:00 h 1.2 m ▼	13:52 h 2.3 m ▲	20:07 h 1.3 m ▼	42 low	
15 Sat		▲ 6:32 h ▼ 17:22 h	2:13 h 2.4 m ▲	8:55 h 1.2 m ▼	14:59 h 2.1 m ▲	21:11 h 1.4 m ▼	42 low	
16 Sun		▲ 6:33 h ▼ 17:22 h	3:23 h 2.3 m ▲	10:01 h 1.3 m ▼	16:33 h 2.1 m ▲	22:31 h 1.4 m ▼	46 low	
17 Mon		▲ 6:34 h ▼ 17:22 h	4:53 h 2.2 m ▲	11:13 h 1.2 m ▼	17:55 h 2.3 m ▲	23:52 h 1.3 m ▼	53 average	
18 Tue		▲ 6:34 h ▼ 17:23 h	6:08 h 2.3 m ▲	12:21 h 1.1 m ▼	18:53 h 2.4 m ▲		63 average	
19 Wed		▲ 6:35 h ▼ 17:23 h	1:01 h 1.2 m ▼	7:04 h 2.4 m ▲	13:17 h 1.0 m ▼	19:39 h 2.7 m ▲	73 high	
20 Thu		▲ 6:35 h ▼ 17:24 h	1:56 h 1.0 m ▼	7:51 h 2.6 m ▲	14:06 h 0.8 m ▼	20:21 h 2.9 m ▲	83 high	
21 Fri		▲ 6:36 h ▼ 17:24 h	2:43 h 0.8 m ▼	8:34 h 2.7 m ▲	14:51 h 0.6 m ▼	21:02 h 3.1 m ▲	91 very high	
22 Sat		▲ 6:36 h ▼ 17:25 h	3:27 h 0.6 m ▼	9:16 h 2.9 m ▲	15:34 h 0.4 m ▼	21:43 h 3.2 m ▲	96 very high	
23 Sun		▲ 6:37 h ▼ 17:25 h	4:10 h 0.5 m ▼	9:59 h 3.0 m ▲	16:17 h 0.4 m ▼	22:24 h 3.3 m ▲	98 very high	
24 Mon		▲ 6:37 h ▼ 17:26 h	4:53 h 0.4 m ▼	10:41 h 3.0 m ▲	17:01 h 0.4 m ▼	23:06 h 3.3 m ▲	95 very high	
25 Tue		▲ 6:38 h ▼ 17:26 h	5:37 h 0.4 m ▼	11:26 h 3.0 m ▲	17:45 h 0.4 m ▼	23:50 h 3.2 m ▲	89 high	
26 Wed		▲ 6:38 h ▼ 17:27 h	6:22 h 0.5 m ▼	12:12 h 2.9 m ▲	18:32 h 0.6 m ▼		81 high	
27 Thu		▲ 6:38 h ▼ 17:27 h	0:36 h 3.1 m ▲	7:10 h 0.6 m ▼	13:02 h 2.7 m ▲	19:22 h 0.8 m ▼	72 high	
28 Fri		▲ 6:39 h ▼ 17:28 h	1:25 h 2.9 m ▲	8:02 h 0.8 m ▼	13:59 h 2.6 m ▲	20:18 h 1.0 m ▼	64 average	
29 Sat		▲ 6:39 h ▼ 17:29 h	2:23 h 2.6 m ▲	9:01 h 0.9 m ▼	15:09 h 2.4 m ▲	21:25 h 1.2 m ▼	58 average	
30 Sun		▲ 6:40 h ▼ 17:29 h	3:34 h 2.4 m ▲	10:10 h 1.0 m ▼	16:34 h 2.3 m ▲	22:47 h 1.3 m ▼	56 average	
31 Mon		▲ 6:40 h ▼ 17:30 h	4:58 h 2.3 m ▲	11:28 h 1.1 m ▼	17:56 h 2.4 m ▲		58 average	

3.4 Turbine Selection

Low head hydro plants are those designed for different water levels of 20 meters or less and have a capacity of 1 MW or less.

Here Compact axial Kaplan turbine (CAK) is considered for its flow rate of 6-60m^3/s and head of 2-12 m. That is also fulfilling our required head and flow rate. From this turbine we can get power up to 6MW.

CHAPTER 4

MODELING OF TIDAL SURGE

4.1 Modeling of Tidal Power Generation

Tidal strength is extracted from the earth ‘s oceanic tides; tidal forces are periodic versions in gravitational appeal exerted with the aid of celestial our bodies. Those forces create corresponding motions or currents within the global’s ocean. Because of the sturdy attraction to the oceans, a bugle in the water degree is created, causing a brief growth in sea degree. When the ocean stage is raised, water from the center of the sea is pressured to transport forward the seashores, developing a tide. This incidence takes vicinity in an unfailing way, because of the steady pattern of the moon’s orbit around the earth. The value and person of this motion reflects the converting positions of the moon and sun relative to the earth, the outcomes of earth’s rotation and neighborhood geography of the ocean floor and coastlines.

A tidal generator converts the power of tidal flows into strength. Greater tidal variation and higher tidal modern velocities can dramatically increase the potential of a website for tidal power generation. Tidal electricity is the only generation that attracts on strength inherent in the orbital characteristics of the Earth–Moon gadget, and to a lesser volume within the Earth–Sun system. Other herbal energies exploited by using human technology originate without delay or in a roundabout way with the Sun, inclusive of fossil gasoline, conventional hydroelectric, wind, bio-gasoline, wave and sun power. Nuclear energy uses Earth's mineral deposits of fissionable elements, whilst geothermal energy faucets the Earth's internal warmth, which comes from an aggregate of residual warmth from planetary accretion (approximately 20%) and warmth produced thru radioactive decay (eighty%).

AS the Earth's tides are ultimately because of gravitational interaction with the Moon and Sun and the Earth's rotation, tidal power is almost inexhaustible and categorized as a renewable electricity resource. Movement of tides causes a lack of mechanical electricity inside the Earth–Moon device: that is a result of pumping of water through natural restrictions around coastlines and consequent viscous dissipation at the seabed and in turbulence.

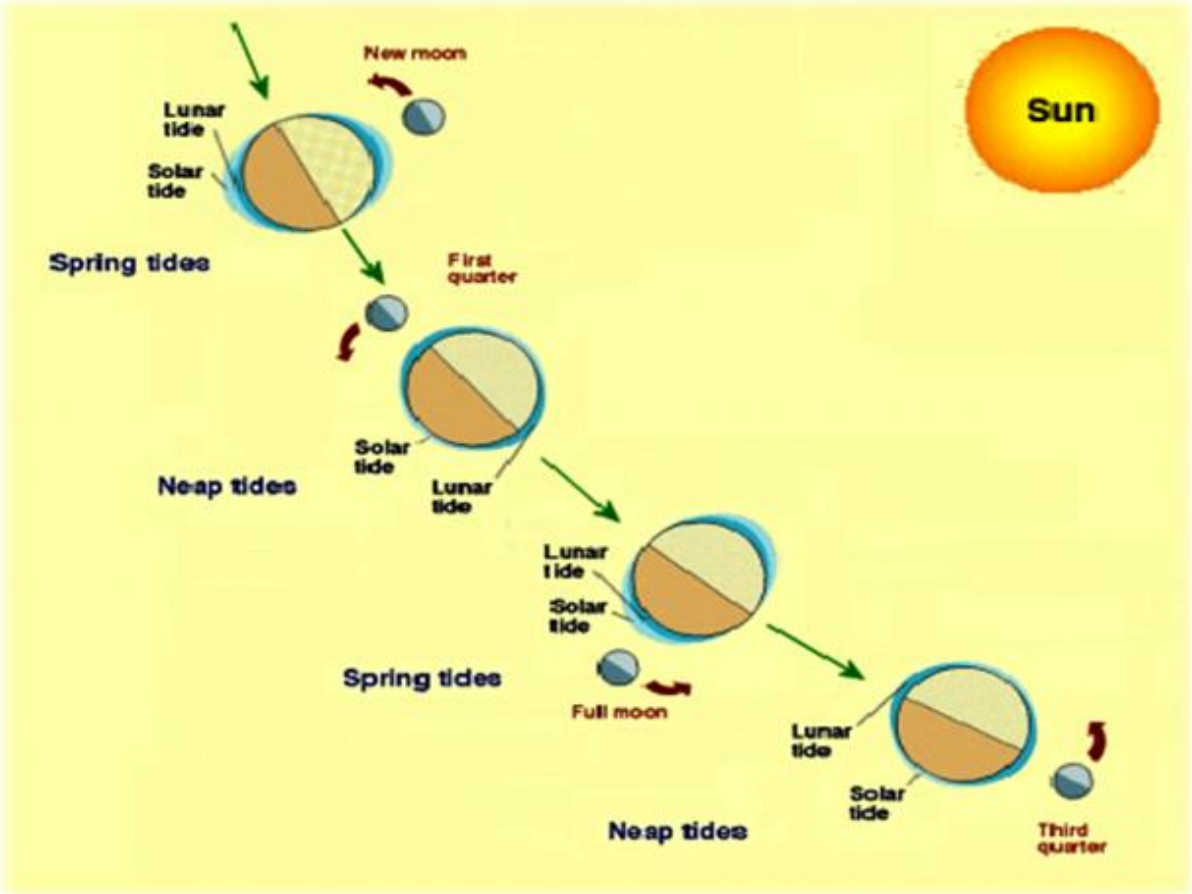

Fig 4.1: Effect of the position of The Sun and the Moon on Earth

This lack of electricity has caused the rotation of the Earth to slow in the 4. Five billion years for the reason that its formation. During the closing 620 million years the duration of rotation of the earth (period of an afternoon) has improved from 21.9 hours to 24 hours; in this era the Earth has

misplaced 17% of its rotational energy. While tidal electricity might also take extra electricity from the machine, the impact is negligible and might most effective be noticed over millions of years.

The incidence of tide is in reality proven in Fig. (four.1) There are excessive tides and low tides around the Earth at any immediately. On any given longitude the c programming language between high tides is about 12 hours 25 minutes. The distinction in height between a high tide and a low tide is known as the tidal range [3].

4.2 Tidal Surge Modeling

two dams are needed for capturing the tidal potential of all most 57.4 km^2 area in dublar chor. The tide has different magnitude at different times of a day. So, a perfect model of high tide and low tide are very much essential for the paper utilization of the water it's at highest level is known high tide. The high tide take place when moon and sun are directly aligned with respect to earth. High tides are less extreme when the moon and sun are at night angles.

The average of high tide and low tide in different months of a year is presented in table 1. they are two high tide data in a day from the data of the average high tides has been taken for a day catenating the number days in a month the average high tide of a month is evaluated.

4.2.1 Average Tide Range

Table 4.1: Average heads of high and low tide

Month	High tide(m)	Low tide (m)	Usable head(m)

January	2.77	0.68	2.09
February	2.59	0.78	1.81
March	2.75	0.78	2.04
April	2.8	0.8	2
May	2.87	0.91	1.96
June	2.92	1.05	1.87
July	3	1.11	1.89
August	3.03	1.11	1.92
September	2.9	1.06	1.84
October	2.97	1.02	1.95
November	2.89	0.92	1.97
December	2.8	0.82	1.98

It's seen that highest amount of the tide of high tide is found in August with a magnitude 0.71m. the usable hade is also given in the 4th column of the same table.

A probability density function (PDF) model of high tide is presented in fig 4.2. A PDF is function of a continuous random variable. Whose value at given a sample in the simple space can be interpreted as providing a relative like LaHood that value at the random variable would equal to the sample.

Is clearly observed from the figure that the probability found from 0.02 to 0.2 with the occurrence of maximum probability within the tidal range from 2.56m to .7m

4.2.2 High Tide

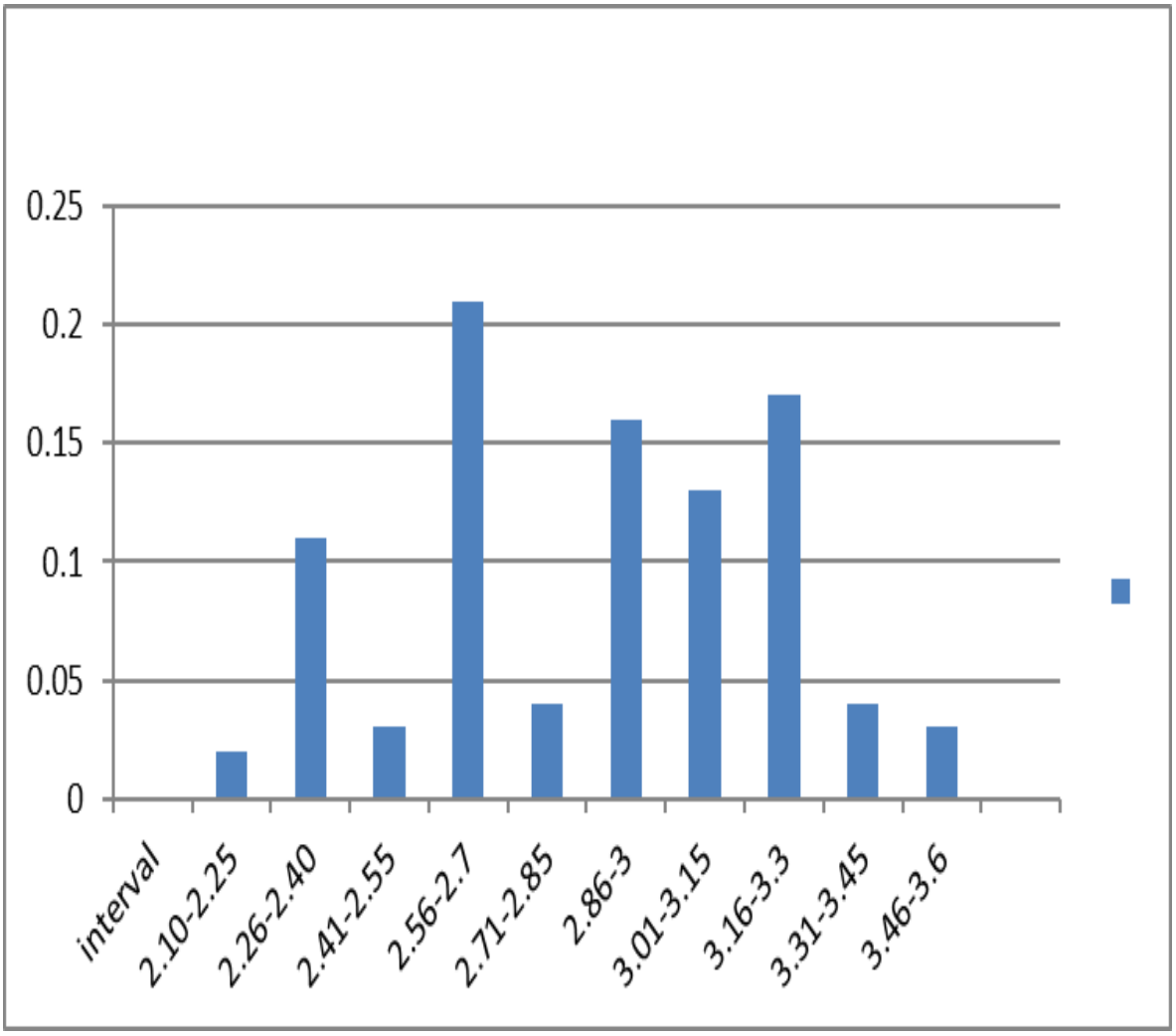

Fig 4.2: PDF Model of high tide

For the development of PDF model. Firstly, arrange of heads has been selected and secondly the probability of the occur once of the heads has been selected total days are courted for each range of head and then the country days are divided by 365 for getting the probability.

4.2.3 Low Tide

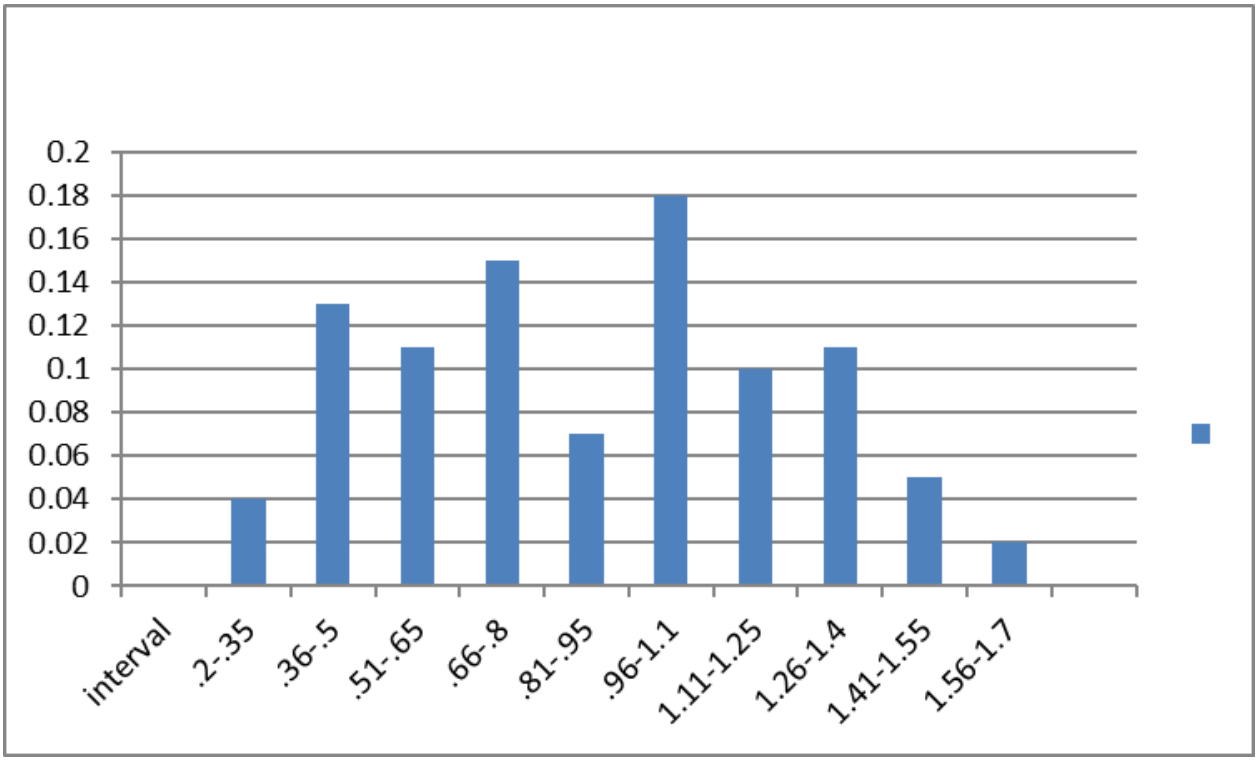

Fig 4.3: PDF Model O Low Tide

A PDF for low tide is also developed and presented in figure 4.3. The probability of low tide found from 0.02 to 0.18 with the occurrence of minimum probability within the tidal range 0.96m to 1.1m

CHAPTER 5

POWER GENERTION

5.1 Electrical Power Generation Modeling

The amount of electrical power generation depends on several factors like, lowest head, turbine position dischargeable head it is expected that the turbine is set at the dischargeable head is 0.91m.

5.1.1 Number of Turbines:

So, the number of turbines is calculated by the

$$N= (A\times h)/ (Q\times t) \qquad (1)$$

Where,

A=reservoir of area in square meter

h= dischargeable head of water in meter

Q= flow rate of turbine in cubic meter/hour

t= working hour of turbine

The area of the confined location of the reservoir is of 57.4 km^2, considered water head is of 0.91, flow rate of the turbine is of 53028 m^3/hr and the running time is of 0.92 hour at a time. using equation 1 evaluated turbine number is as follow:

N= (57400000× 0.91)/ (53028× 0.92) = 1070

So, 1070 turbines are need to discharge able the value of the discharge able water of the proposed reservoir.

5.1.2 Power Calculation

The total output power calculation is given by the equation (2)

P= ηρghQ * N (2)

Here,

η =efficiency of turbine

ρ =saline water density

g=constant for gravity

h=head of water

Q=rate of water flow

N=number of turbine

In this work the selected turbine is compact Anal Kaplan turbine has the efficiency of 85%. taking the practical value and aforementioned calculation.

The total number of turbine is of 1070 saline water density of 1025 kg/m^3.constant for gravity is of 9.8 m/s^2.head of water is of 1.95m and rete of water flow is 14.73 m^3/s. hence the output power is evaluated using equation (2):

P= 0.85 ×9.8× 1.95× 14.73× 1025× 1070=262.41MW

SO, the prospective generation of electricity is 262.41MW and can be obtained twice a day.

5.2 Energy Calculation

The resource and generation model and the monthly average electricity generation that can be obtained is presented in table(5.1).it is clearly observed that the maximum 281.25MW of power can be obtained during the month of January and minimum one of the 243.57MW can be obtained during the month of February. It is also seen that the total energy production in a year is of 228.06× 10^4MWh.

5.3 Power and Energy Generation

Table 5.1: Monthly possible generation capacity

Month	Power output (MW)	Energy (MWh)
January	281.25	20×10^4
February	243.57	16.36×10^4
March	274.52	20.4×10^4

April	269.14	19.4×10^4
May	263.76	19.6×10^4
June	251.65	18.1×10^4
July	254.34	18.9×10^4
August	258.37	19.2×10^4
September	247.61	17.8×10^4
October	262.41	19.5×10^4
November	265.1	19×10^4
December	266.45	19.8×10^4
Total		228×10^4

CHAPTER 6

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

In recent times, energy crisis is a major issue all over the world. At this critical stage renewable energy is considered as the most important alternative energy resource. For the betterment of the future of the world it is crucial to emphasize.

This paper proposed the possible electricity generation from tidal potential in coastal area especially in dublar char. Resource modeling and generation modeling are applied for feasible power generation. According to this work, 262.41 MW of electrical power can be generated twice a day in the coastal area to solve the power crisis in Bangladesh. Tidal power can play a vital role for the renewable energy generation because of its potential amount, free of pollution and better predictability than wind and solar power. The erection of a barrage at the proposed location can results in the development of the local area. There will be no adverse effect of constructing the barrage at Dublar char point. Moreover, it will provide the transportation facilities of the people in the place. Dublar char still depends on costly diesel engine generator. The energy generation from the project will provide electricity to the local people at a cheaper rate. The project will provide better communication system between the island and main land and it may be the best tourist place of the country.

6.2 Recommendation

As the planet increasingly looks to curb greenhouse emissions. It is not uncommon to see solar and wind energy take center stage in the debate. However, a sometimes – neglected from of energy could play a major role in preparing economies for a future that is less dependent on fossil fuels- tidal energy.

The potential energy that could be harvested from tidal movements on a global scale is enormous. It is estimated that around 1 terawatt of exploitable be enough to power 10 billion 100-watt lightbulbs at once.

Many European countries are already embracing tidal with France and the U.K as leading example.

Since tides are predictable and do not occur at the same time along the same stretch of coastline plants can be regulated and designed to work at full capacities on alternating determing. Schedules, thus providing constant available power to the grid.

Thanks to new technology a number of tidal energy options have now surfaced; ready to transform the way are generate energy for our ground demands.

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