CHAPTER I

INTRODUCTION

Almost 80 percent of power is furnished by sources such as natural gas, coal, or oil, which are quickly being depleted as well as being environmentally unfriendly. We have also developed some destructive processes such as the nuclear power plants, which would also be as word of Damocles of all human beings. Luckily, we have already realized the importance of making an enormous change in our way of life and our way of using the energy.[1]

Think that if the energy of world is end what we can do then? so looking for renewable resources to substitute current ones is much urgent for us. So we need some other source of energy. Allah gives us the other natural source of energy. We need to find way to extract this energy from. Tidal energy is produced through the use of tidal energy generators. These large underwater turbines are placed in areas with high tidal movements, and are designed to capture the kinetic motion of the ebbing and surging of ocean tides in order to produce electricity. Tidal power has great potential for future power and electricity generation because of the massive size of the oceans. These articles explore the potential energy of tidal power technologies. A dam with a sluice was constructed spanning a tidal inlet, or a section of a tidal estuary was turned into a reservoir. At high tide sea water flowed into the reservoir through a one way gate. The gate closed automatically when the tide began to fall and when the tide was low enough, the stored water was released to turn a water wheel. Tidal energy is a form of hydropower that converts the energy of the tides into electricity or other useful forms of power. The tide is created by the gravitational effect of the sun and the moon on the earth. Tidal energy is therefore an entirely predictable form of renewable energy, which can be harnessed in two forms.

1.1 Background

Harvesting energy from the tides is a surprisingly old method; the technology has improved and changed through time but the general concept of using the waxing and waning of the moon and the correlating tides has remained constant.

People have harnessed the tides and used its energy for many centuries. Tide mills which are the precursors to today's tidal power plants have great similarity to water wheels. The

difference is that water must first be collected from the incoming tide before it can be released to rotate the water wheel.

The oldest, excavated tide mill is dated to the year 619. It was discovered at Northern Ireland's Nendrum Monastery on Mahee Island in Strangford Lough. The power generated by this mill was probably used for grinding grain. [2]

By the 18th century, 76 tide mills were being used in London alone. At one time there were about 750 tide mills in operation around the shores of the Atlantic Ocean. This included about 300 on North American shores, [3] about 200 in the British Isles, and about 100 in France.[4]

Harnessing the power of the tides is not a new idea. As early as the 12th century, tidal mills were built in Britain, France and Spain. In 1607, a mill powered partially by tidal energy was built in Port Royal, Nova Scotia. These early mills converted roughly 25 to 75 kilowatts of energy from tidal power - enough to power about 10 modern homes. There are currently many tidal power plants in the world - one in France, one in Russia, and one in Nova Scotia, one in Britain, one in South Korea. These are all barrage plants that use dams to hold the water before releasing it through a generator - similar to conventional hydroelectric plants. Nova Scotia's Tidal Generating Station has been operating since 1984. It uses Bay of Fundy tides to produce 20 megawatts of energy - enough to power about 6,000 homes.[5] Woodbridge Tide Mill, dating from 1170, in Suffolk, England, is an excellent example

1.2 Problem statement
 In Bangladesh there is no effective research on this field. Our vast costal area is unused. On the other hand the reserve of Natural Gas, Petroleum, Coal and Diesel Oil is being decreased. The Gas, Oil, Coal Power plant is not environment friendly. So getting a polluting free renewable energy source is very much crying need.

1.3 Objectives
The main objective of the project is to study the prospect of energy from tides and waves which can be used to drive water turbines to generate electricity. Tides can cause huge quantities of water to rush back and forth as they ebb and flow. This movement of water can be used to drive generators.

1.   The specific objective of this study is to predict tidal energy at some selected sites in the coastal areas of Bangladesh.

CHAPTER II

DEFINITION

2.1 Basic definition

Chart Datum (CD):

A chart datum is the level of water that charted depths displayed on a nautical chart are measured from. A chart datum is generally a tidal datum; that is, a datum derived from some phase of the tide.

Mean low water spring (MLWS):

The mean low water spring is the lowest level to which spring tides retreat on average over a period of time.

Mean Low water neaps (MLWN):

The average height of low waters occurring at the time of the neap tides. It is usually derived by taking a plane depressed below the half-tide level by an amount equal to one-half the neap range of tide.

Mean high water spring (MHWS):

The mean high water spring is the highest level that spring tides reach on the average over a period of time.

Mean high water neap (MHWN):

The average height of the high waters occurring at the time of neap tide. It is usually derived by taking a plane depressed above the half-tide level by an amount equal to one-half the neap range of tide.

Mean see level (MSL):

Mean sea level is a datum representing the average height of the ocean's surface (such as the halfway point between the mean high tide and the mean low tide); used as a standard in reckoning land elevation.

Mean tide level (MTL):

The arithmetic mean of mean high water and mean low water.
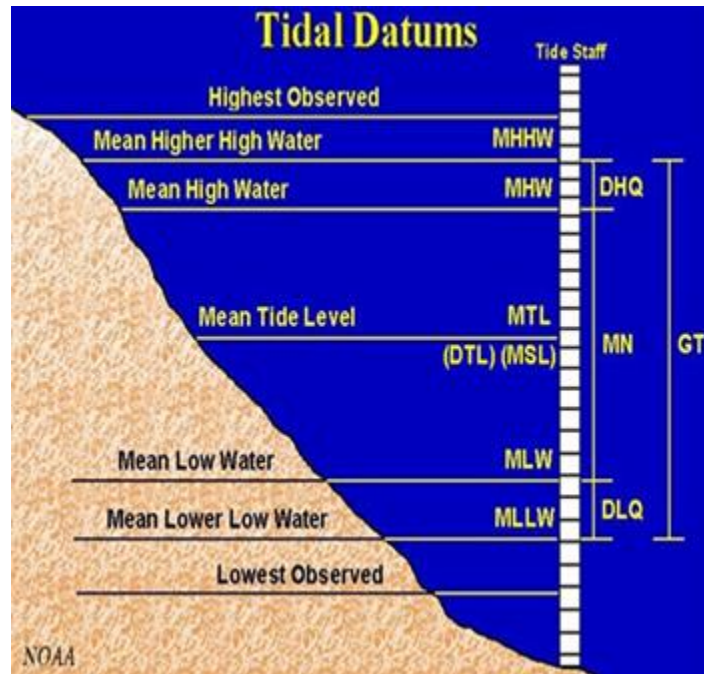
Figure 2.1:CO-OPS representation of tidal datum.

Highest Astronomical Tide (HAT):

The elevation of the highest predicted astronomical tide expected to occur at a specific tide station over the National Tidal Datum Epoch.

Lowest Astronomical Tide (LAT):

The elevation of the lowest astronomical predicted tide expected to occur at a specific tide station over the National Tidal Datum Epoch.

Mean High Water (MHW):

The average of all the high water heights observed over the National Tidal Datum Epoch.

Mean Low Water (MLW):

The average of all the low water heights observed over the National Tidal Datum Epoch.

Mean Higher High Water (MHHW):

The average of the higher high water height of each tidal day observed over the National Tidal Datum Epoch.

Mean Lower Low Water (MLLW):

The average of the lower low water height of each tidal day observed over the National Tidal Datum Epoch.

Diurnal Tide Level (DTL):

The arithmetic mean of mean higher high water and mean lower low water.

Mean Range of Tide (MN):

The difference in height between mean high water and mean low water.

Mean Diurnal High Water Inequality (DHQ):

The difference in height of the two high waters of each tidal day for a mixed or semidiurnal tide.

Mean Diurnal Low Water Inequality (DLQ):

The difference in height of the two low waters of each tidal day for a mixed or semidiurnal tide.

Great Diurnal Range (GT):

The difference in height between mean higher high water and mean lower low.

CHAPTER III

SURVEY of TIDAL ENERGY EXTRACTION METHODS

The tidal current was used by water mills on Evrepos Strait, in Cephalonia, in the floating tide mills on the Danube, Tiber, Seine and Russian rivers. A plant functioned briefly in northwestern Iceland and another has been mentioned in the Faroe Islands. The Danube tide mills have used undershot wheels since the Roman times to harness the tidal current. Some of them were still in use below the Iron Gate as late as 1970. [6]

3.1 The modest forerunners

The terms 'sea mill' and later 'tide mill' designated those mills that took advantage of the tides with or without retaining ponds. There were thus tide mills that took advantage of the ebb and/or flood current. Some such mills were even ''dual-powered''.

The Dunkirk (Dunkerque, France) ''Perse mill'' (end of the 17th century to 1714), the Bacalan mill a few kilometers north of Bordeaux on the Gironde River, and the El Ferol mill (Galicia, Spain) used an ingenious hydraulic machinery that allowed them to use both ebb and flood currents for power production. The scheme installed in the Thames river under the London Bridge. The Demi-Ville (Morbihan Department, France) was an example of dual-powered mill using both the fluvial current and the tidal currents. [6]

3.2 Past proposals & researches

For harnessing the tidal energy (estimated about 25 GW of electricity) an ''aqua power barge'', capable of harnessing energy along coasts and on tidal rivers, proposed in 1979, would use a high-impulse low-head turbine. With a 6-knot current, 50 kW of installed power could be produced.

Patents have been taken out in the United States since the 19th century for a variety of devices intended to tap the energy of waterways directly; they encompass small units as well as ''giant'' paddlewheels.

Aero environment Inc., where the Coriolis Project was developed, A project that examined a scheme to tap the Florida Current. Davis and Swan sought to develop a ducted Darrieus design. Designs of non-conventional conversion systems have been frequently reviewed (Pratte, Davis, and others). Vertical axis turbines were proposed by Davis and Swan.

A technology assessment conducted by New York University on behalf of the State of New York and daeling principally with the tapping of the tidal current in the East River in New York city. The various types of Kinetic hydro energy conversion systems included waterwheels, free-ducted and Wells rotor axial-flow turbines, Darrieus, Savonius, and cyclo-giro type vertical axis rotors and the Schneider Lift Translator. The conclusion of the studies was that the system would cost less than US$ 1700 per kilowatt installed. A prototype was installed in the East River's semi-diurnal Eastern Channel in 1985.

Theodore Herzl in 1902 in his novel ''Altneuland'' have suggested a canal linking the Dead and Mediterranean Seas, and proposed to tap the current to generate electrical power. Some thoughts to that effect had been expressed as early as 1850. The James Hayes Commission which, in 1943, made the first assessment. Apparently, the plan has been laid to rest; probably better so in view of the probable ecological consequences it would have.

The advantages of the Turbo dyne Generator were praised in 1982: the amount of turbine material is small and the high speed vertical-axis turbine was shown in theory and actual tests were performed.

Baker and Wishart conducted a study covering three small estuaries and 17 sites in Great Britain and, in terms of 1983 dollars, arrived at a cost varying between US$ 6.10 and 6.30, depending on the number of turbines per kW h. [6]

3.3 Existing Tidal Power Projects

3.3.1 Seaflow project

➢ A marine turbine prototype, developed by Marine Current Turbines Limited. It is considerate as the world's first tidal current turbine, but it was not connected to the grid. Concerning the firm, it was the first stage in a commercial way to exploit marine currents. It has been implanted in 2003 in Lynmouth, a city of Bristol's Bay in the United Kingdom, above 1.1 km offshore. The first run occurs the 30th May of 2003.

➢ The turbine is composed of a single axial flow rotor (supporting 2 blades) installed on a steel pile fixed into a socket on the sea floor, about 20 meter undersea. The diameter of the pile is 2.1 meter, the rotor diameter is 11 meter and the turbine's rated power is estimated at 300 kW. The power train (which includes the rotor, the gearbox and the generator) can slide up and down the pile in order to facilitate the maintenance.

Figure 3.1: Design of the Seaflow project developed by Marine Current Turbines Limited.

➢ The cost of the project was estimated at 3.4 million £ and had been financed by the UK DTI, the German government, the European Community and some other partners. This prototype has been test in 2003 and 2004, mostly during the autumn and spring tides (about 30 days). The experiment has shown that the concept of marine turbine worked well. It has delivered electricity that fluctuated up to 30-50 kW; with some electrical peak power just less than 300 kW. [7]

3.3.2 SeaGen

➤ It was installed by Marine Current turbines in Strangford Lough in Northern Ireland in April 2008.The turbine began to generate at full power of about 12 MW in December 2008 and was reported to feed 150 KW intothe grid for the first time on 17 July 2008.It is Currently the only Commercial scale device to have been installed anywhere in the world (MCT, 2008). [8]

Figure 3.2: SeaGen installed by Marine Current Turbine in Strangford Lough in Northern Ireland

3.3.3 Hammerfest Strom AS

➤ The 200 metric ton turbine is anchored on the seabed near Kvalsund. The project had

been developed by Hammerfest Strom, a subsidiary of the Norwegian company Statoil Hydro.

➤ The turbine has been installed in 2003. It is considerate as "the first turbine in the world that generates electricity and supply it to the grid" according to Hammerfest Strom.

➤ The turbine (20 meters diameters, 30 meter high) is composed of an axial flow rotor with 3 blades.

➤ Its current capacity is 3 MW but it is to increase to 20 MW by 2004. The production would

suffice to supply the needs of 1000 homes. Costs have already reached US$ 6.7 million (4 5.73 million) and by the time the entire project is completed, it should have had a price tag of US$ 14 million (4 11.97 million). The cost of the produced electricity at US$ 0.04-0.05 (4 0.034-0.043) is however triple that of hydro plant produced power in Norway.

Figure 3.3: synthesis photo of the turbine developed by Hammerfest Strom AS.

➢ This project, considerate as a prototype according Hammerfest Strom AS and Statoil Hydro, had proven the interest for current technologies. Indeed, there is no visual impact because the turbine is totally submerged, and it also doesn't bother the maritime traffic. Furthermore the fact that the turbine is submerged doesn't create problem for maintenance.

3.3.4 La Rance Tidal Power Plant

➢ Located in northern France on the La Rance River
➢ Completed in 1967 after 25 years of studies and six years of construction. Has 24 bulb turbines, each capable of producing 10 MW power
➢ The dam is 2460 ft. long and 43 feet high.
➢ One of the greatest tide ranges in the world, at 13.5 m.
➢ The blades of the turbine can change directions depending on the current flow.
➢ The turbines weigh 470 tons and have a blade diameter of over 17 feet.
➢ The plant is also equipped with pumps that allow water to be pumped into the basin when the sea is close to basin level at high tide. This allows more electricity to be generated if there is an anticipated increase in demand.

➢ The development has a basin area of 17 km & an installed capacity of 240 MW, and an approximate output of 0.54 TWh/year. The mean tidal range is 8 m.[7]

Figure 3.4: La Rance Tidal Power Plant

3.3.5 Stingray

➢ An oscillating profile's turbine has been developed in the United Kingdoms by the company IHC Engineering Business. The first prototype of this firm, Stingray, has been installed in 2002 in Yell Sound, at the large of Shetland Island, and had worked during 4 years.

➢ The project was supported notably by the DTI (a part of the English Department for Business, Enterprise & Regulatory Reform). The system is 24 meters high and 15 meters long, and was located 36 meter deep under the sea level in a zone where marine's current are estimated to 2 meters per second.[8]

➢ The prototype was dimensioned to produce a net power of 150kW. During its test, it has delivered a power of 90 to 150 kW, showing that the technology work perfectly well. The only negative fact was that the company hasn't communicated on the impact of the system on the environment. [7]

Picture credits: French Observatory of Renewable Energy
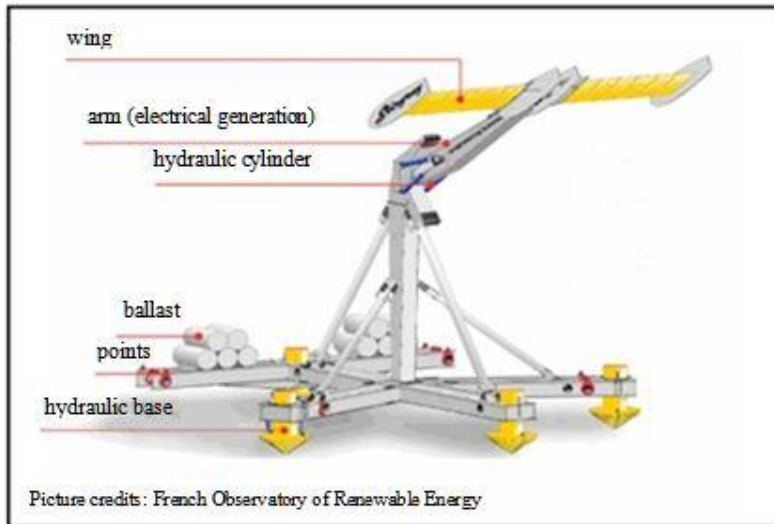
Figure 3.5: Explanatory diagram of the Stingray turbine developed by HIC Engineering Business Ltd. Published in a survey about Ocean Energy from the French Observatory of Renewable Energy.

3.3.6 Annapolis Royal Generating Station

Tidal power station located on the Annapolis River immediately upstream from the town of Annapolis Royal, Nova Scotia, Canada. It is the only tidal generating station in North America. The generating station harnesses the tidal difference created by the large tides in the Annapolis Basin, a sub-basin of the Bay of Fundy. Opened in 1984, the Annapolis Royal Generating Station was constructed by Nova Scotia Power Corporation, which was, at the time, a provincial government Crown corporation that was frequently used to socially benefit various areas in the province. Capacity: 20 mw Status: Operational   Annual generation: 50 Gwh.[11]
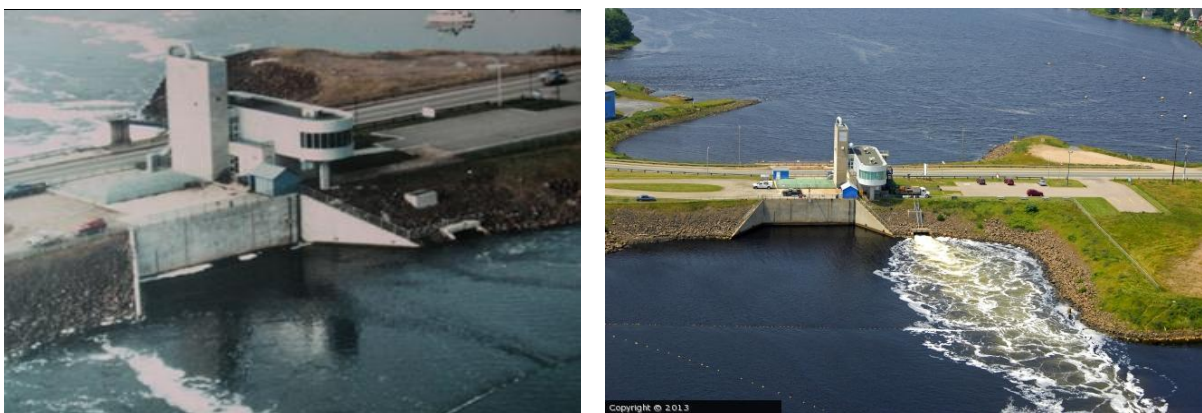
Figure 3.6: Tidal power station located on the Annapolis River

3.3.7 Jiangxia Tidal Power Station

The Jiangxia Tidal Power Station is the fourth largest tidal power station in the world, located in Wuyantou, Wenling City, Zhejiang Province, China. Although the proposed design for the facility was 3,000 KW, the current installed capacity is 3,200 KW, generated from one unit of 500 KW, one unit of 600 KW, and three units of 700 KW, totalling the installed capacity to 3,200 KW. Proposals were made to install a sixth 700 KW unit, but this has not yet been installed. The facility generates up to 6.5 GWh of power annually.This facility also hosts a 40 KW solar PV power installation with an estimated 45,000 KWh annual production capacity. This system is composed of 216 pieces of 185w monocrystalline solar modules manufactured by Perlight Solar.The power station feeds the energy demand of small villages at a 20 km (12 mi) distance, through a 35-kV transmission line. The maximum tidal range in the estuary is 8.39 m (27.5 ft)

Figure 3.7: Jiangxia Tidal Power Station, China

3.3.8 The Kislaya Guba Tidal Power Station

The Kislaya Guba Tidal Power Station is an experimental project in Kislaya Guba, Russia.The station is the world's 5th largest tidal power plant with the output capacity of 1.7 MW. Station began operating in 1968, but was later shut down for 10 years until December 2004, when funding resumed. Old 0.4 MW French-built generation unit was dismantled. In 2004 was installed first new 0.2 MW generation unit, and in 2007 – second, 1.5 MW. The site was originally chosen because the long and deep fjord had a fairly narrow outlet to the sea which could easily be dammed for the project. There are plans for two larger scale projects based on this design near Mezen, on the White Sea and Tugur on the Sea of Okhotsk.

Figure 3.8: The Kislaya Guba Tidal Power Station,Russia

3.3.9 Sihwa Lake Tidal Power Station

Sihwa Lake Tidal Power Station is the world's largest tidal power installation, with a total power output capacity of 254 MW, surpassing the 240 MW Rance Tidal Power Station after 45 years. It is operated by the Korean Water Resource Corporation. The tidal barrage makes use of a seawall constructed in 1994 for flood mitigation and agricultural purposes. Ten 25.4 MW submerged bulb turbines are driven in a un pumped flood generation scheme; power is generated on tidal inflows only and the outflow is sluiced away. This slightly unconventional and relatively inefficient approach has been chosen to balance a complex mix of existing land use, water use, and conservation, environmental and power generation considerations. The tidal power station provides indirect environmental benefits as well as renewable energy generation. After the seawall was built, pollution built up in the newly created Sihwa Lake reservoir, making its water useless for agriculture. In 2004, seawater was reintroduced in the hope of flushing out contamination; inflows from the tidal barrage are envisaged as a complementary permanent solution. Cost of the project was met by the South Korean Government, totaling 313.5 billion won. Mean operating tidal range is 5.6 m, with a spring tidal range of 7.8 m. The working basin area was originally intended to be 43 km^2 although this has been reduced by land reclamation and freshwater dykes. The basin will eventually be only around 30 km2. Construction cost ₩313.5 billion.

Figure 3.9: Sihwa Lake Tidal Power Station, satellite projection, Korea

3.3.10 Uldolmok Tidal Power Station

Uldolmok Tidal Power Station is a tidal power station in Uldolmok, Jindo County, South Korea. The plant was commissioned in May 14, 2009 by the South Korean government. The plant cost US$10 million and has an installed capacity of 1,000 KW (1 MW), generating 2.4 GWh annually, sufficient to meet the demand of 430 households. Additional 500 kW was commissioned in June 2011.The South Korean government plans to increase this capacity of 1 MW to 90 MW by the end of the year 2013, increasing the demand cover to 46,000 households, while simultaneously working on the 254 MW Sihwa Lake Tidal Power Station. Part of the goal of generating 5,260 GWh through tidal power by 2020.The Uldolmok Strait experiences tidal water speeds that exceed 6.5 m/s with the width of the strait being approximately 300 m.

Figure 3.10: Uldolmok Tidal Power Station, Korea

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3.4 Power Plant under Construction

3.4.1 Incheon Tidal Power Station

The Incheon Tidal Power Station is a large tidal power station currently under construction at the Incheon Bay, South Korea. The facility is expected to top 1,320 MW in generating capacity with the help of 44 water turbines rated at 30 MW each, making this facility one of the largest of it kind in the world. The construction and developments costs are expected to reach ₩3.9 trillion (US$3.4 billion), of which would be entirely covered by private funding. The station is expected to generate up to 2.41 TWh of energy annually upon its completion in June 2017.

3.5 Power Plant planned by different countries

3.5.1 Dalupiri Blue Energy Project

Capacity: 2,200 MW Country: Philippines.

Figure 3.11: Dalupiri Blue Energy Project

3.5.2 Garorim Bay Tidal Power Station

Garorim Bay Tidal Power Station is a planned tidal power plant in Garorim Bay, on the west coast of South Korea. The project is developed by Korea Western Power Company Limited and was in the process of receiving government approval as of November 2008. Garorim Bay is located between Seosan City and Taean County of Chungnam Province, South Korea, at the western seashore of South Korea. The electric power generation capacity of the plant will

be 520 megawatt (26 MW * 20 sets). This is more than twice the capacity of the Rance Power Plant in France.

According to an announcement made by the power company, construction cost was estimated to be 1 trillion Korean won (1 billion US dollars) as of 2005.

Figure 3.12: Garorim Bay Tidal Power Station project, South Korea

3.5.3 Severn Tidal Power Group – 1989

The £4.2 million study by Severn Tidal Power Group (STPG) built on the work of the Severn Barrage Committee, but also examined other possible barrages, and produced another major energy paper. Its members comprised Sir Robert McAlpine, Balfour Beatty, Taylor Woodrow and Alstom. They concluded that the 1981 plans were the best location for a barrage, but calculated that the power output could be larger, at 8,640 MW during flow, or 2,000 MW average power. This would provide 17 TWh of power per year (about 6% of UK consumption), equivalent to about 18 million tons of coal or 3 nuclear reactors. The cost in 1989 was calculated to be about £8 billion (£12 billion in 2006 money – about the same as six nuclear reactors, but different lifespan), and running costs would be £70 million per year (about the same as 1.5 nuclear reactors). The barrage would contain 216 turbines each generating 40 MW for the 8,640 MW total. Arrays of sluices would let the tide in and then close to force it out through the turbines after the tide has gone out some distance outside the barrage. This deliberate building of a head on the water builds pressure that makes the turbines more efficient. The barrage would contain a set of shipping locks, designed to handle the largest container vessels. Construction would take about eight years and would require 35,000 employees at peak build time. The minimum lifespan of the barrage would be 120

years (about three times that of a nuclear reactor), but could easily be 200 years if decent maintenance was performed.
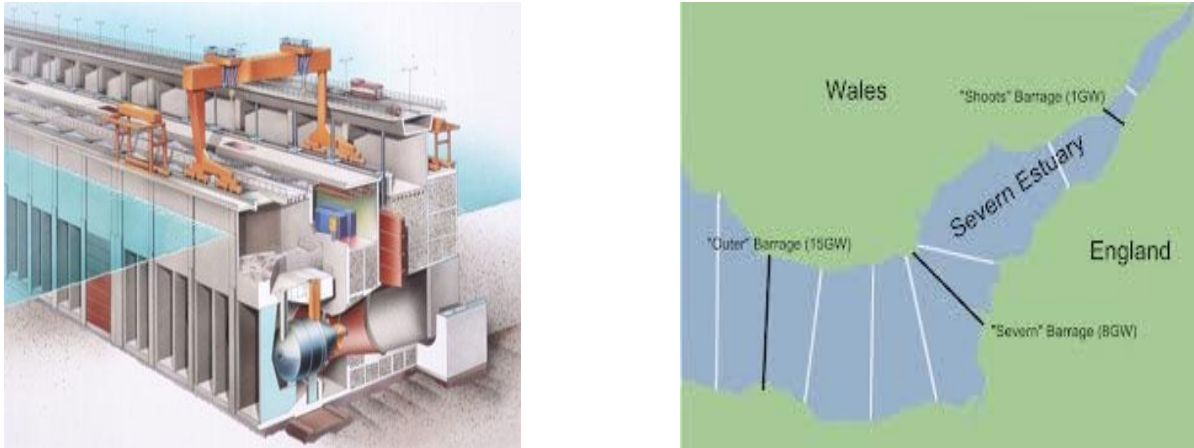
Figure 3.13: Severn Tidal Power Group,animated projection

3.5.4 Penzhin Tidal Power Plant Project

The Penzhin Tidal Power Plant Project is a set of proposals for construction of tidal power plant in the Penzhin Bay, which is an upper right arm of Shelikhov Bay in the north-east corner of the Sea of Okhotsk. Because Penzhin Bay has one of the strongest tides, there have been several proposals of power stations. One of proposed variants presumes an installed capacity 87 GW and annual production 200 TWh of electricity.Geographically, the dam of the power station would extend through the administrative border of Magadan Oblast and Kamchatka Krai of Russia

Figure 3.14: The Penzhin Tidal Power Plant Project, Russia

3.6 Projects in Progress

The results of the projects developed till nowadays have shown the interest and the feasibility for this technology. Moreover the world global situation's on energy and the oil lack prediction explain the fact that some countries are studying project to develop this renewable energy technology.

In France, EDF Renewable Energy in cooperation with the company Hydro helix has thrown back the project "Marenergie" (project first developed by Hydro helix then gave up because of financing lacking).The project, plan for 2011, will be installed in Britain, precisely near Paimpol / Heaux de Brehat. This zone has been chosen because according to EDF28 in one of its statement "it is a zone where marine current's intensity reaches level among the most important in Europe"29. It will consist on 3 turbines connected to the grid. The power produced, estimated at 4 MW, which will be able to supply 20 000 houses in electricity. This pilot project will be a test for EDF with the mains objectives to test the technology Hydro helix in real conditions and to value the profitability of the system, in order to develop a network in France.

In England, Marine Current Turbines Ltd has planed the third phase of its development: it consists on a farm of 5MW named SeaGen Array project. It will be a farm of several turbines similar to the SeaGen project, and will be located in the same place of this project. The final aim is to install a capacity of 500MW in the United Kingdoms.

Hammerfest Strom, in cooperation with Scottish Power, has founded Hammerfest Strom UK and planned to develop a 5MW farm in Scotland. Actually, the project is postponed due to financing lacking. Some projects are also in studies in the United States of America. A company named Florida hydro had said that she was studying a project to convert the energy of the Gulf Stream in electricity.

The project would consist on a park of 1 500 MW for an investment cost estimated at 650 M€, with a payback time of 4 years. Actually, there is no information available about dates and this park.[10]

CHAPTER IV

PROSPECTS of TIDAL ENERGY in COASTAL AREAS of BANGLADESH

4.1 Introduction

Tidal power is considered large scale only, but in Bangladesh it is possible to create small-scale systems.

Bangladesh has a long coastal area (710 km) with2~8 m tidal height/head rise and fall (in a large number of deltaic islands, where barrages and sluice gates already exist) (BIWTA, 1999).

Thus it has some large tidal sites and many channels of low tidal range in a large number of deltaic islands, where barrages and sluice gates already exist. These coastal areas are protected by embankments, which were constructed during 1960s from the protection of natural disasters like flooding and tidal surges.

These barrages and sluice gates may be used for electricity generation by applying simple technology that can have widespread application.

The barrages necessary for creating controlled flow through turbines (to tap tidal power) are also needed for flood control. This therefore avoids the problem of high capital cost as the engineering is either already there or is needed for cyclone protection. [9]

4.2 Potential Sites in Bangladesh

Potential spots for harnessing tidal power in Bangladesh are the coastal areas of Cox's bazar, Chittagong, Khulna, Sandwip etc. Following data are representing the selection of most promising spot for tidal energy extraction.

STATION	LAT	MLWS	MLWN	ML	MHWN	MHWS	HAT	TD(AT)
Hiron Points	-0.256	0.225	0.905	1.700	2.495	3.175	3.656	3.912
Sundarikota	-0.553	0.036	0.636	1.829	3.022	3.694	4.211	4.764
Mongla	-0.261	0.325	1.194	2.310	3.427	4.296	4.882	5.143
Khal no. 10	-0.444	0.261	1.231	2.664	4.097	5.067	5.772	6.216
Sadarghat	-0.423	0.239	1.100	2.481	3.861	4.722	5.385	5.808
Cox's Bazar	-0.339	0.205	1.023	1.995	2.967	3.785	4.329	4.668
S. Island	-0.348	0.191	1.045	1.874	2.703	3.557	4.096	4.444
Sandwip	-0.583	0.238	1.634	3.243	4.851	6.248	7.070	7.653
Char Changa	-0.375	0.256	1.060	2.037	3.014	3.818	4.449	4.824
Khepupara	-0.323	0.195	1.025	2.060	3.096	3.925	4.445	4.768
C.Ramdaspur	-0.261	0.189	0.763	2.036	3.309	3.883	4.333	4.594
Barisal	+0.134	0.434	0.692	1.539	2.386	2.644	2.944	2.810
Chandpur	+0.019	0.256	0.493	2.172	3.852	4.088	4.326	4.307
Nalmuri	+0.078	0.370	0.722	2.195	3.669	4.021	4.313	4.235
Narayanganj	+0.458	0.585	0.697	2.770	4.844	4.956	5.083	4.625
Galachipa	-0.159	0.283	0.937	1.764	2.592	3.245	3.689	3.848
Patuakhali	-0.143	0.242	0.740	1.575	2.409	2.907	3.293	3.436

Tidal levels in Coastal Bangladesh [BIWTA, 1999]

Variation of Mean Tidal Levels (1998)

Along The Coast of Bangladesh (Rl In Meters)

(Linked All The Places of Observation With CD of Hiron Point) [17]

	Places	CD	MLWS	MLWN	MTL (MSL)	MHWN	MHWS
1	HIRON POINT	0.000	0.225	0.905	1.700	2.495	3.175
2	KHEPUPARA	-0.360	-0.165	0.665	1.700	2.736	3.565
3	CHARCHANGA	-0.337	-0.081	0.723	1.700	2.777	3.481
4	SANDWIP	-1.543	-1.305	0.091	1.700	3.308	4.705
5	PATENGA (KHL-18)	-1.080	-0.869	0.108	1.700	3.496	4.473
6	COX'S BAZAR	-0.295	-0.090	0.728	1.700	2.372	3.490
7	SHAHPURI ISLAND/TEKNAF	-0.174	0.017	0.871	1.700	2.529	3.383

Now we plot a graph CD vs. Places with respect to Hiron point as a datum. Here we see that CD is higher in sandwip.

Figure 4.1: Chart Datum at different place.
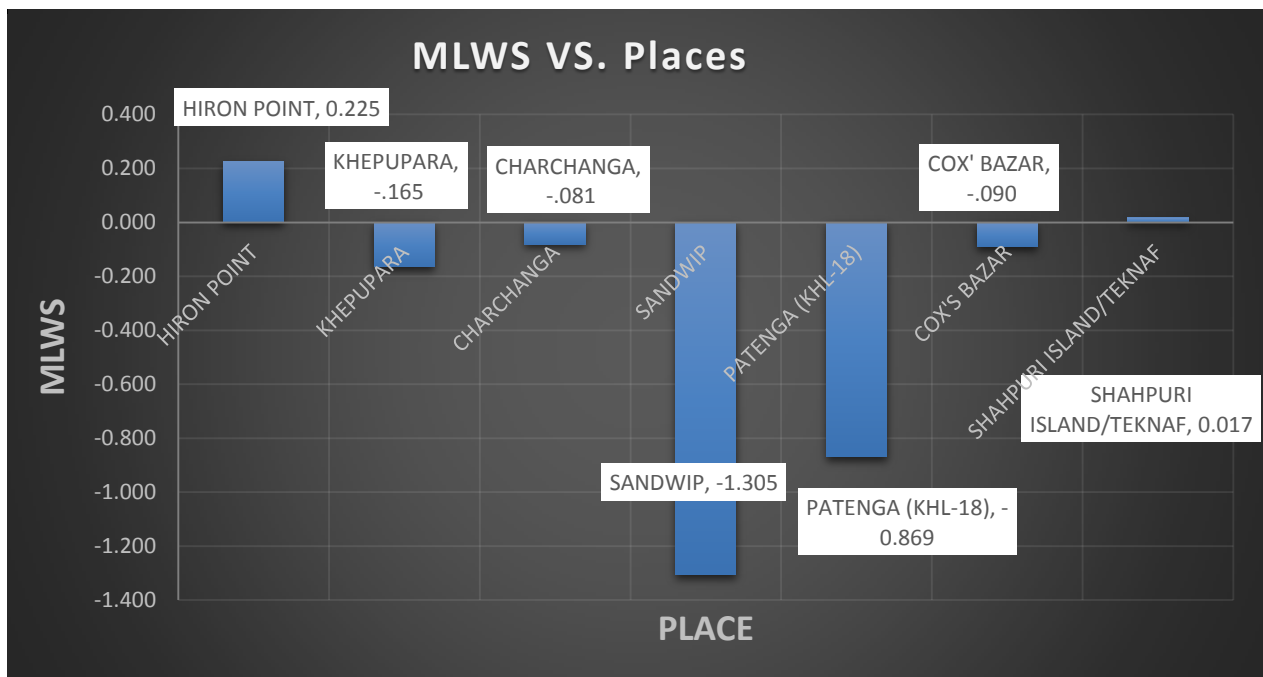
Figure 4.2: Mean low water spring at different place.

From above figure we see that minimum low water is in sandwip.
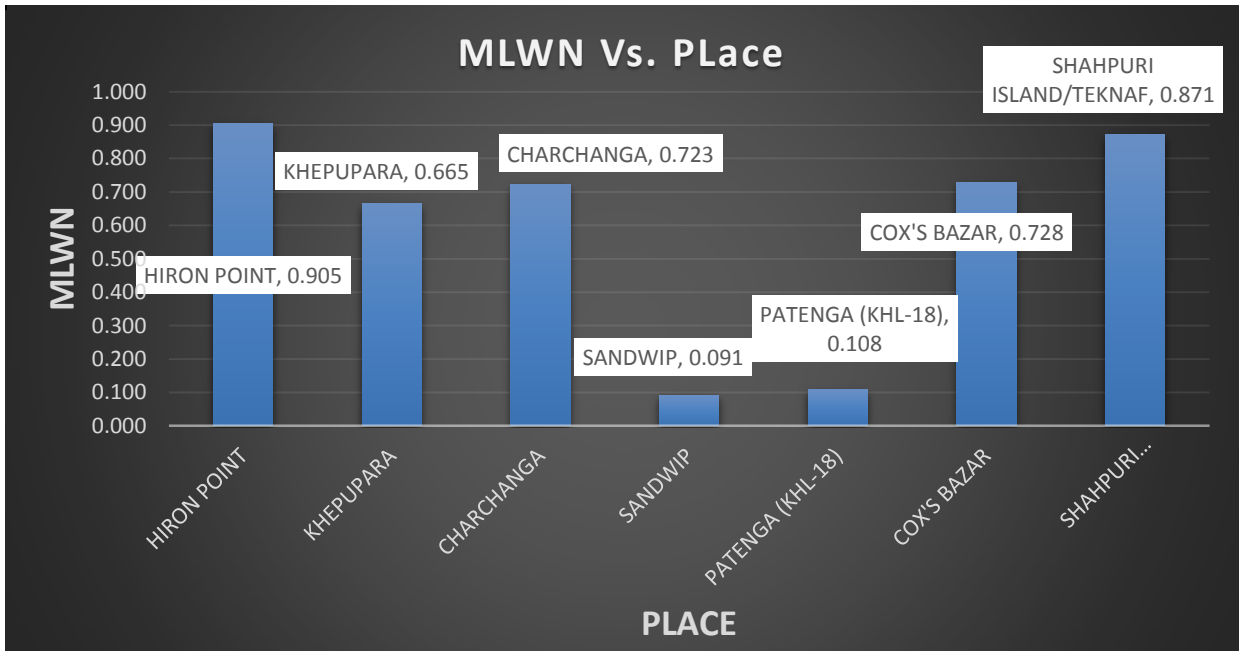
Figure 4.3: Mean Low water neap at different place.
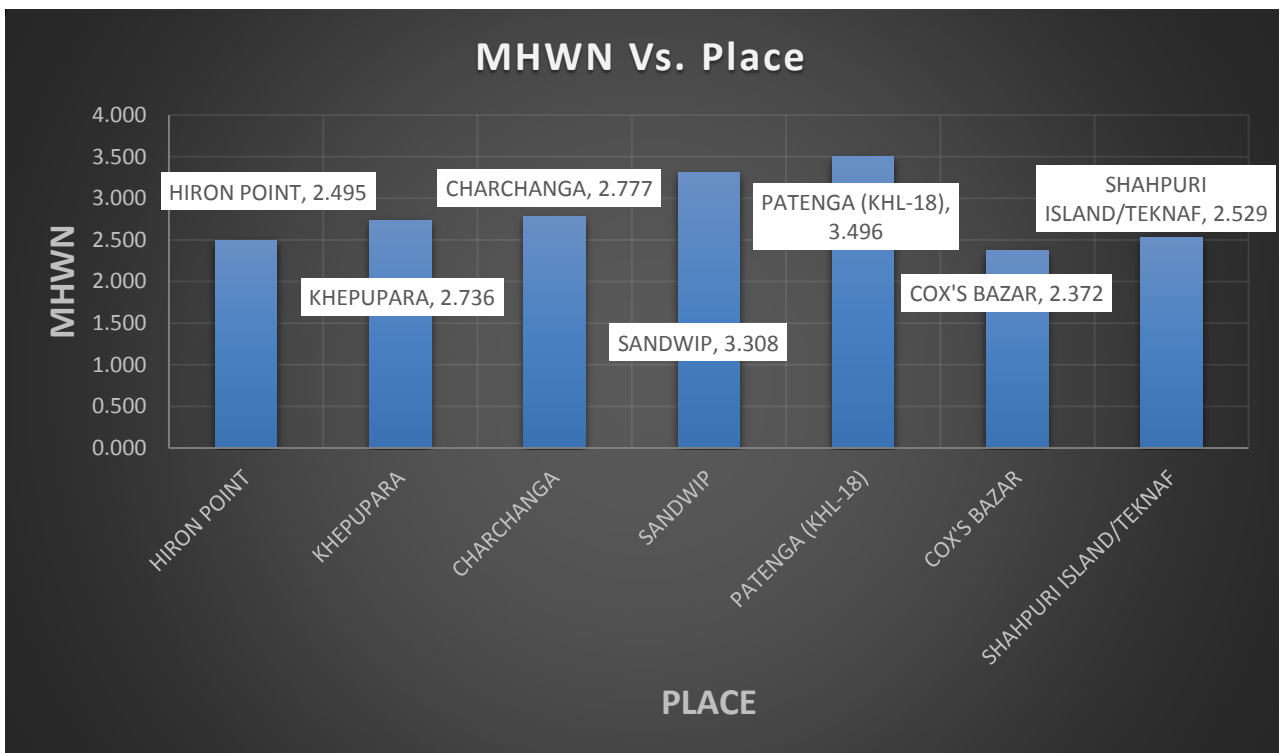
Figure 4.4: Mean high water neap at different place.
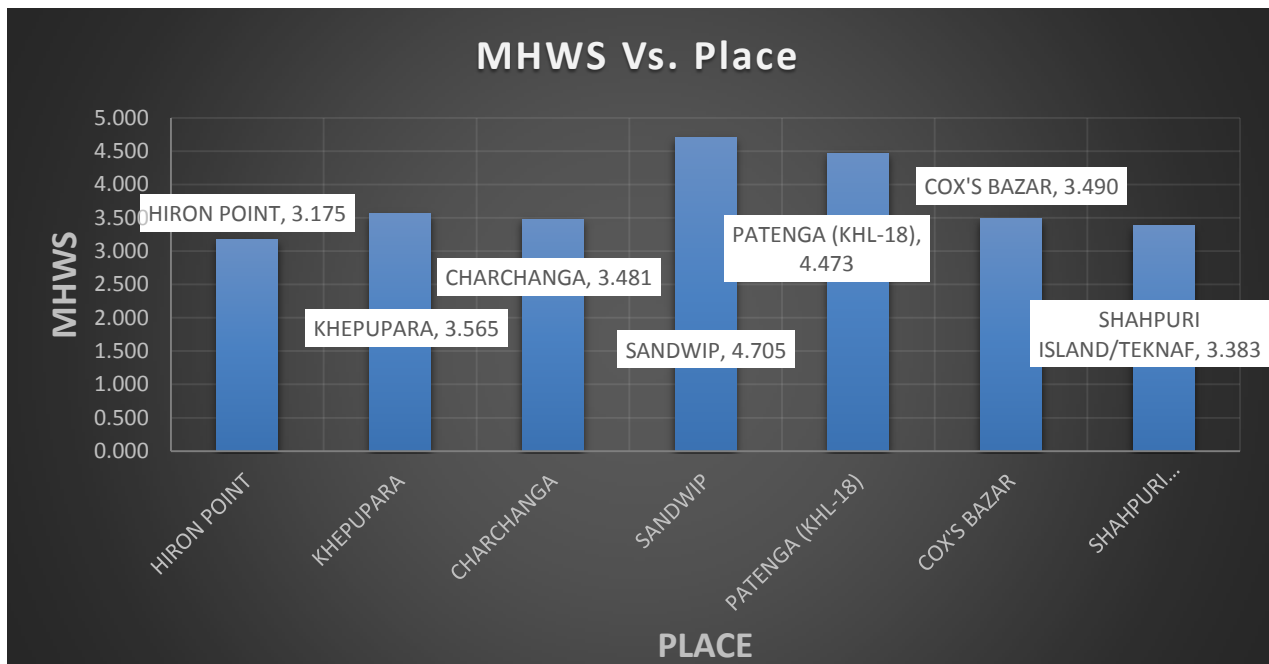
Figure 4.5: Mean high water spring at different place.

From the above tables and figures we have to take a decision that where we place our turbine. The most efficient area for setup the turbine is where the amplitude of water is large. We notice that in sandwip the fluctuation of tide is much which is the difference of mean high water minus mean low water at spring. But in neap we notice that the difference of mean high water minus mean low water in neap is much in patenga. But as patenga is very close to Kornuphuli River so many vessels pass through patenga. For this reason we cannot setup our turbine in patenga. After patenga sandwip is the best place where we can setup the turbine.

4.3 Drawback of our countries

➢ The depths of Bangladesh prospect area are very low.

➢ The flow rate of water is also low.

➢ Most of the projected area is near the shipping rout. So the project area is small. So project also small.

➢ The difference between high tide and low tide is small. So the energy extract is small.

Other countries like Canada and Britain get a long tide range and their sea depth and flow rate is high. So their project is more cost effective than ours.

CHAPTER V

CALCULATION of POTENTIAL ENERGY

5.1 Calculation of potential energy

Let us consider,

Tidal variation = R

Horizontal area of the basin = A

dE = ygdm

Where dm = mass of water

Ady = Volume of the water

ρ = density of water

dE = ρAgydy

Total potential energy,

$$E = \int_0^R \rho Ag \cdot y \, dy$$

$$\gg E_{max} = \rho Ag \int_0^R y \, dy$$

$$\gg E_{max} = \tfrac{1}{2} \rho Ag \, R^2$$

$$\therefore E_{max} = \tfrac{1}{2} \times \text{Mass of water} \times \text{Tidal head}$$

We have 2 high tides and 2 low tides every day. At low tide the potential energy is zero. Therefore the total maximum energy potential per day = Energy for a single high tide $\times$ 2

Maximum power generation potential = ($\tfrac{1}{2} \times \rho \times A \times g \times R^2 \times 2$) / t

Actual power generation potential = $\tfrac{1}{4} \times$ Maximum power generation potential
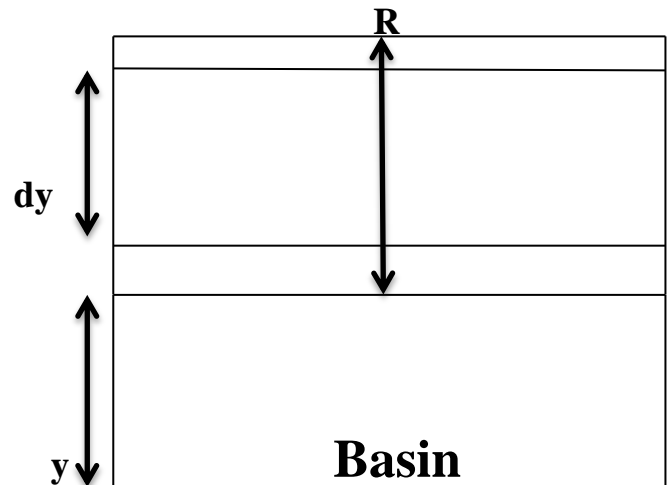
Here,

Assume the horizontal surface area of the basin = 3 sq. Km

Density of water = 1025 Kg/m^3

Gravitational acceleration = 9.81 m/s

Now if the average height in one day is 3.5 m

Maximum Potential energy content of the water in the basin at high tide = ½ × area × density × gravitational acceleration × tidal range squared

$$= 1/2 \times 1025 \times 9.81 \times 3 \times 10^6 \times 3.5^2$$

$$= 1.848 \times 10^{11} \text{ J}$$

Now we have 2 high tides and 2 low tides every day. At low tide the potential energy is zero. Therefore the total energy potential per day = Energy for a single high tide × 2

$$= 1.848 \times 10^{11} \times 2$$

$$= 3.695 \times 10^{11} \text{ J}$$

Now 1 Lunar day = 24 hr. 48 min

$$= 89280 \text{ sec}$$

Therefore, the maximum power generation potential = Energy generation potential / time in 1 day

$$= 3.695 \times 10^{11} \text{ J} / 89280 \text{ s}$$
$$= 4138664.875 \text{ W}$$
$$= 4.139 \text{ MW}$$

But actual power generation potential is one fourth of the maximum power generation potential. [16]

Actual power generation potential = ¼ × 4.139

$$= 1.035 \text{ MW}$$

ENERGY IN SANDWIP CHANNEL DURING YEAR 2013

month/year	Jan-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.05	3000000	2.79698E+11	3132813.49	783203.37	0.78
2	3.06	3000000	2.81538E+11	3153424.05	788356.01	0.79
3	3.79	3000000	4.33304E+11	4853313.73	1213328.43	1.21
4	3.00	3000000	2.71039E+11	3035836.16	758959.04	0.76
5	2.93	3000000	2.58087E+11	2890757.67	722689.42	0.72
6	2.87	3000000	2.4804E+11	2778221.06	694555.26	0.69
7	2.94	3000000	2.59855E+11	2910557.32	727639.33	0.73
8	2.96	3000000	2.64747E+11	2965354.80	741338.70	0.74
9	2.97	3000000	2.66537E+11	2985407.86	746351.97	0.75
10	2.13	3000000	1.36859E+11	1532918.81	383229.70	0.38
11	2.91	3000000	2.55886E+11	2866103.13	716525.78	0.72
12	2.92	3000000	2.56325E+11	2871025.59	717756.40	0.72
13	2.92	3000000	2.57205E+11	2880883.19	720220.80	0.72
14	2.92	3000000	2.57646E+11	2885818.32	721454.58	0.72
15	2.92	3000000	2.57646E+11	2885818.32	721454.58	0.72
16	2.92	3000000	2.57205E+11	2880883.19	720220.80	0.72
17	3.65	3000000	4.02618E+11	4509605.43	1127401.36	1.13
18	2.84	3000000	2.42877E+11	2720393.24	680098.31	0.68
19	2.80	3000000	2.35656E+11	2639511.57	659877.89	0.66
20	2.77	3000000	2.31877E+11	2597186.01	649296.50	0.65
21	2.81	3000000	2.37345E+11	2658432.74	664608.19	0.66
22	2.83	3000000	2.40742E+11	2696477.81	674119.45	0.67
23	2.34	3000000	1.65176E+11	1850084.91	462521.23	0.46
24	2.85	3000000	2.44162E+11	2734793.17	683698.29	0.68
25	2.88	3000000	2.49773E+11	2797632.15	699408.04	0.70
26	2.92	3000000	2.57205E+11	2880883.19	720220.80	0.72
27	2.97	3000000	2.65194E+11	2970361.73	742590.43	0.74
28	2.99	3000000	2.69685E+11	3020663.32	755165.83	0.76
29	3.00	3000000	2.71492E+11	3040902.22	760225.55	0.76
30	3.02	3000000	2.74668E+11	3076482.89	769120.72	0.77
31	3.04	3000000	2.77864E+11	3112270.50	778067.63	0.78
Average=	2.93					0.73
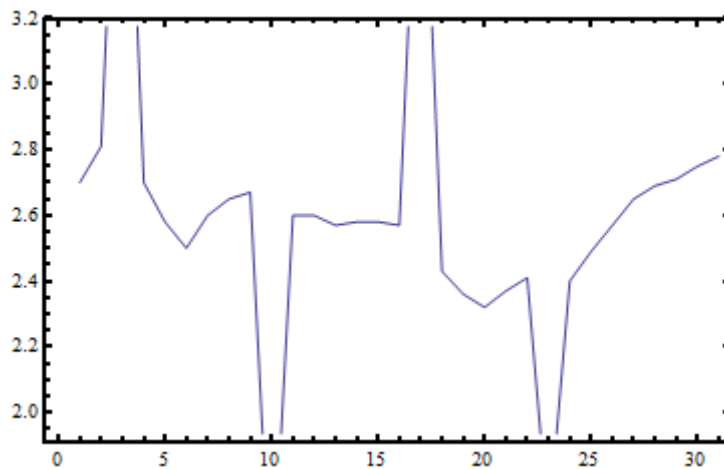
Sandwip Channel January 2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

month/year	Feb-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.03	3000000	2.76035E+11	3091795.10	772948.77	0.77
2	3.77	3000000	4.27985E+11	4793738.32	1198434.58	1.20
3	2.87	3000000	2.4804E+11	2778221.06	694555.26	0.69
4	2.78	3000000	2.32714E+11	2606562.13	651640.53	0.65
5	2.81	3000000	2.37345E+11	2658432.74	664608.19	0.66
6	2.84	3000000	2.42877E+11	2720393.24	680098.31	0.68
7	2.87	3000000	2.47607E+11	2773378.85	693344.71	0.69
8	2.07	3000000	1.28841E+11	1443114.58	360778.65	0.36
9	2.83	3000000	2.41168E+11	2701252.45	675313.11	0.68
10	2.86	3000000	2.46744E+11	2763707.09	690926.77	0.69
11	2.89	3000000	2.52383E+11	2826875.50	706718.87	0.71
12	2.91	3000000	2.5457E+11	2851361.09	712840.27	0.71
13	2.90	3000000	2.54132E+11	2846455.53	711613.88	0.71
14	2.90	3000000	2.5282E+11	2831764.17	707941.04	0.71
15	2.88	3000000	2.50641E+11	2807363.04	701840.76	0.70
16	3.56	3000000	3.83025E+11	4290153.65	1072538.41	1.07
17	2.76	3000000	2.29375E+11	2569159.03	642289.76	0.64
18	2.70	3000000	2.20316E+11	2467694.26	616923.57	0.62
19	2.71	3000000	2.21132E+11	2476833.86	619208.47	0.62
20	2.79	3000000	2.34813E+11	2630076.33	657519.08	0.66
21	2.86	3000000	2.46744E+11	2763707.09	690926.77	0.69
22	2.27	3000000	1.55898E+11	1746168.65	436542.16	0.44
23	2.86	3000000	2.47175E+11	2768540.85	692135.21	0.69
24	2.93	3000000	2.58528E+11	2895701.25	723925.31	0.72
25	2.98	3000000	2.67884E+11	3000492.01	750123.00	0.75
26	3.01	3000000	2.73305E+11	3061208.69	765302.17	0.77
27	3.03	3000000	2.76035E+11	3091795.10	772948.77	0.77
28	3.04	3000000	2.78321E+11	3117399.91	779349.98	0.78
Average=	3.0025					0.71

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

Sandwip Channel

February 2013

month/year	Mar-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.05	3000000	2.80157E+11	3137959.79	784489.95	0.78
2	3.04	3000000	2.77864E+11	3112270.50	778067.63	0.78
3	3.81	3000000	4.38656E+11	4913257.04	1228314.26	1.23
4	2.86	3000000	2.45882E+11	2754052.22	688513.06	0.69
5	2.76	3000000	2.29791E+11	2573819.64	643454.91	0.64
6	2.79	3000000	2.34393E+11	2625365.04	656341.26	0.66
7	2.82	3000000	2.3989E+11	2686941.20	671735.30	0.67
8	2.88	3000000	2.49339E+11	2792773.04	698193.26	0.70
9	2.10	3000000	1.33623E+11	1496671.85	374167.96	0.37
10	2.86	3000000	2.45882E+11	2754052.22	688513.06	0.69
11	2.91	3000000	2.5457E+11	2851361.09	712840.27	0.71
12	2.95	3000000	2.62963E+11	2945369.32	736342.33	0.74
13	2.96	3000000	2.64747E+11	2965354.80	741338.70	0.74
14	2.95	3000000	2.62517E+11	2940383.51	735095.88	0.74
15	2.94	3000000	2.59855E+11	2910557.32	727639.33	0.73
16	2.92	3000000	2.57205E+11	2880883.19	720220.80	0.72
17	2.90	3000000	2.54132E+11	2846455.53	711613.88	0.71
18	3.50	3000000	3.70235E+11	4146893.37	1036723.34	1.04
19	2.77	3000000	2.31041E+11	2587826.79	646956.70	0.65
20	2.76	3000000	2.28959E+11	2564502.65	641125.66	0.64
21	2.85	3000000	2.44592E+11	2739601.60	684900.40	0.68
22	2.94	3000000	2.59855E+11	2910557.32	727639.33	0.73
23	3.00	3000000	2.71944E+11	3045972.50	761493.12	0.76
24	2.35	3000000	1.67063E+11	1871228.57	467807.14	0.47
25	3.04	3000000	2.77864E+11	3112270.50	778067.63	0.78
26	3.09	3000000	2.88026E+11	3226093.16	806523.29	0.81
27	3.12	3000000	2.93645E+11	3289039.84	822259.96	0.82
28	3.13	3000000	2.96003E+11	3315447.12	828861.78	0.83
29	4.18	3000000	5.27068E+11	5903539.99	1475885.00	1.48
30	4.18	3000000	5.26228E+11	5894128.21	1473532.05	1.47
31	3.1075	3000000	2.91297E+11	3262738.15	815684.54	0.82
Average=	3.02					0.78

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

month/year	Apr-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.90	3000000	4.58821E+11	5139124.75	1284781.19	1.28
2	2.93	3000000	2.58087E+11	2890757.67	722689.42	0.72
3	2.86	3000000	2.47175E+11	2768540.85	692135.21	0.69
4	2.91	3000000	2.55447E+11	2861184.90	715296.22	0.72
5	2.94	3000000	2.60297E+11	2915517.79	728879.45	0.73
6	3.01	3000000	2.73759E+11	3066295.86	766573.97	0.77
7	2.30	3000000	1.6004E+11	1792559.30	448139.82	0.45
8	3.02	3000000	2.74668E+11	3076482.89	769120.72	0.77
9	3.07	3000000	2.84772E+11	3189655.13	797413.78	0.80
10	3.11	3000000	2.90829E+11	3257490.48	814372.62	0.81
11	3.11	3000000	2.92235E+11	3273246.15	818311.54	0.82
12	3.10	3000000	2.89425E+11	3241772.81	810443.20	0.81
13	3.08	3000000	2.86629E+11	3210451.52	802612.88	0.80
14	3.07	3000000	2.84772E+11	3189655.13	797413.78	0.80
15	3.06	3000000	2.82922E+11	3168926.31	792231.58	0.79
16	3.06	3000000	2.81538E+11	3153424.05	788356.01	0.79
17	3.59	3000000	3.89502E+11	4362696.07	1090674.02	1.09
18	2.97	3000000	2.66089E+11	2980388.26	745097.07	0.75
19	3.01	3000000	2.72851E+11	3056125.73	764031.43	0.76
20	3.15	3000000	2.99795E+11	3357918.39	839479.60	0.84
21	3.22	3000000	3.12285E+11	3497816.78	874454.20	0.87
22	3.28	3000000	3.24041E+11	3629487.85	907371.96	0.91
23	2.57	3000000	1.99242E+11	2231650.56	557912.64	0.56
24	3.30	3000000	3.2751E+11	3668350.16	917087.54	0.92
25	3.32	3000000	3.31998E+11	3718620.07	929655.02	0.93
26	3.32	3000000	3.32499E+11	3724226.73	931056.68	0.93
27	3.31	3000000	3.30499E+11	3701825.42	925456.36	0.93
28	3.29	3000000	3.26517E+11	3657225.52	914306.38	0.91
29	3.26	3000000	3.20098E+11	3585327.19	896331.80	0.90
30	3.22	3000000	3.12285E+11	3497816.78	874454.20	0.87
Average=	3.11					0.82
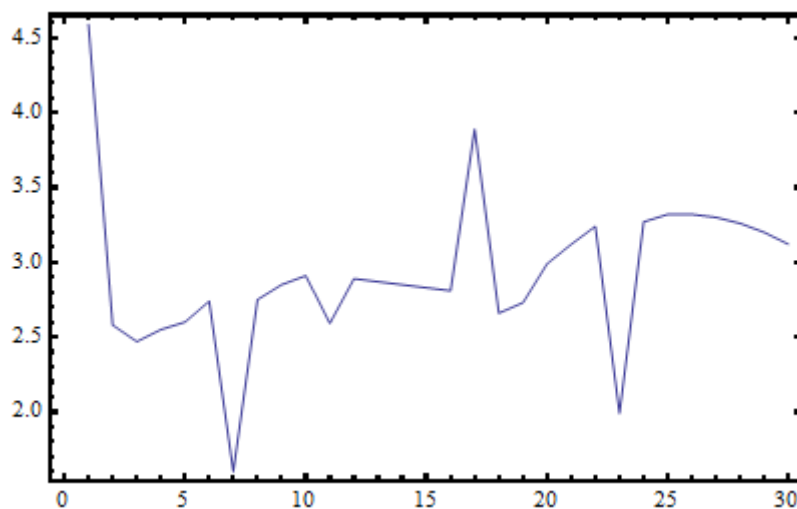
Sandwip Channel

April 2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

month/year	May-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.92	3000000	4.64328E+11	5200802.50	1300200.63	1.30
2	3.10	3000000	2.89425E+11	3241772.81	810443.20	0.81
3	3.14	3000000	2.97422E+11	3331342.17	832835.54	0.83
4	3.17	3000000	3.02655E+11	3389949.22	847487.31	0.85
5	3.24	3000000	3.16179E+11	3541436.83	885359.21	0.89
6	3.28	3000000	3.2503E+11	3640570.25	910142.56	0.91
7	2.64	3000000	2.10243E+11	2354874.68	588718.67	0.59
8	3.31	3000000	3.30998E+11	3707419.41	926854.85	0.93
9	3.34	3000000	3.3551E+11	3757955.41	939488.85	0.94
10	3.33	3000000	3.35007E+11	3752323.40	938080.85	0.94
11	3.33	3000000	3.34003E+11	3741072.07	935268.02	0.94
12	3.33	3000000	3.34003E+11	3741072.07	935268.02	0.94
13	3.33	3000000	3.34003E+11	3741072.07	935268.02	0.94
14	3.33	3000000	3.34003E+11	3741072.07	935268.02	0.94
15	3.33	3000000	3.34003E+11	3741072.07	935268.02	0.94
16	3.93	3000000	4.65907E+11	5218492.30	1304623.07	1.30
17	3.29	3000000	3.26517E+11	3657225.52	914306.38	0.91
18	3.29	3000000	3.26517E+11	3657225.52	914306.38	0.91
19	3.35	3000000	3.38535E+11	3791836.13	947959.03	0.95
20	3.47	3000000	3.63223E+11	4068355.50	1017088.88	1.02
21	3.52	3000000	3.74297E+11	4192392.64	1048098.16	1.05
22	3.56	3000000	3.81772E+11	4276118.81	1069029.70	1.07
23	2.79	3000000	2.34813E+11	2630076.33	657519.08	0.66
24	3.54	3000000	3.78559E+11	4240134.80	1060033.70	1.06
25	3.54	3000000	3.78025E+11	4234152.25	1058538.06	1.06
26	3.52	3000000	3.73235E+11	4180499.33	1045124.83	1.05
27	3.49	3000000	3.67422E+11	4115388.12	1028847.03	1.03
28	3.47	3000000	3.62177E+11	4056639.58	1014159.90	1.01
29	3.44	3000000	3.56969E+11	3998313.39	999578.35	1.00
30	4.21	3000000	5.34661E+11	5988583.89	1497145.97	1.50
31	3.3675	3000000	3.42081E+11	3831555.80	957888.95	0.96
Average=	3.38					0.97

Sandwip Channel

May 2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

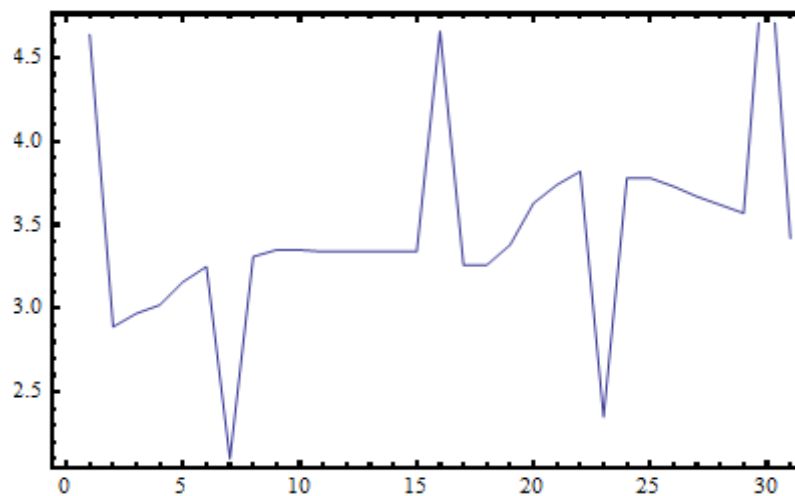| month/year	Jun-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.40	3000000	3.47691E+11	3894390.55	973597.64	0.97
2	3.43	3000000	3.54897E+11	3975101.17	993775.29	0.99
3	3.48	3000000	3.65319E+11	4091838.02	1022959.51	1.02
4	3.54	3000000	3.76958E+11	4222199.81	1055549.95	1.06
5	3.01	3000000	2.727E+11	3054432.36	763608.09	0.76
6	3.55	3000000	3.80699E+11	4264107.25	1066026.81	1.07
7	3.56	3000000	3.81772E+11	4276118.81	1069029.70	1.07
8	3.57	3000000	3.83383E+11	4294167.83	1073541.96	1.07
9	3.58	3000000	3.86077E+11	4324334.00	1081083.50	1.08
10	3.59	3000000	3.88779E+11	4354605.76	1088651.44	1.09
11	3.61	3000000	3.92035E+11	4391071.25	1097767.81	1.10
12	3.61	3000000	3.93123E+11	4403260.20	1100815.05	1.10
13	3.61	3000000	3.93668E+11	4409361.01	1102340.25	1.10
14	3.62	3000000	3.94758E+11	4421575.30	1105393.82	1.11
15	4.27	3000000	5.50009E+11	6160496.23	1540124.06	1.54
16	3.58	3000000	3.87156E+11	4336430.04	1084107.51	1.08
17	3.56	3000000	3.82846E+11	4288147.27	1072036.82	1.07
18	3.63	3000000	3.97491E+11	4452184.94	1113046.23	1.11
19	3.70	3000000	4.13527E+11	4631803.01	1157950.75	1.16
20	3.72	3000000	4.16324E+11	4663130.63	1165782.66	1.17
21	3.02	3000000	2.75124E+11	3081582.73	770395.68	0.77
22	3.70	3000000	4.12411E+11	4619301.52	1154825.38	1.15
23	3.70	3000000	4.12411E+11	4619301.52	1154825.38	1.15
24	3.68	3000000	4.09072E+11	4581898.42	1145474.61	1.15
25	3.66	3000000	4.04641E+11	4532264.14	1133066.04	1.13
26	3.65	3000000	4.01883E+11	4501379.98	1125344.99	1.13
27	3.64	3000000	3.99135E+11	4470601.40	1117650.35	1.12
28	4.46	3000000	6.00045E+11	6720934.51	1680233.63	1.68
29	3.57	3000000	3.84459E+11	4306221.63	1076555.41	1.08
30	3.57	3000000	3.84998E+11	4312254.87	1078063.72	1.08
Average=	3.61					1.11
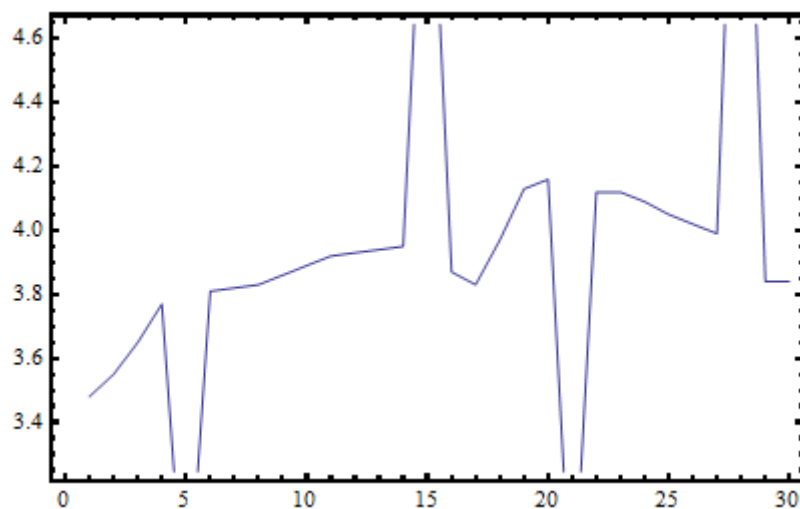
Sandwip
Channel

Jun
2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

32

month/year	Jul-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.60	3000000	3.91491E+11	4384983.11	1096245.78	1.10
2	3.63	3000000	3.98039E+11	4458319.53	1114579.88	1.11
3	3.68	3000000	4.09072E+11	4581898.42	1145474.61	1.15
4	3.24	3000000	3.16668E+11	3546908.35	886727.09	0.89
5	3.70	3000000	4.11854E+11	4613057.11	1153264.28	1.15
6	3.71	3000000	4.15764E+11	4656856.66	1164214.17	1.16
7	3.73	3000000	4.19693E+11	4700863.16	1175215.79	1.18
8	3.75	3000000	4.24772E+11	4757747.04	1189436.76	1.19
9	3.78	3000000	4.3045E+11	4821352.58	1205338.14	1.21
10	3.79	3000000	4.33876E+11	4859718.63	1214929.66	1.21
11	3.80	3000000	4.34448E+11	4866127.75	1216531.94	1.22
12	3.80	3000000	4.36167E+11	4885380.46	1221345.12	1.22
13	3.81	3000000	4.37315E+11	4898236.72	1224559.18	1.22
14	4.55	3000000	6.23592E+11	6984674.58	1746168.65	1.75
15	3.77	3000000	4.28174E+11	4795859.68	1198964.92	1.20
16	3.70	3000000	4.13527E+11	4631803.01	1157950.75	1.16
17	3.68	3000000	4.08517E+11	4575679.35	1143919.84	1.14
18	3.75	3000000	4.23075E+11	4738747.74	1184686.93	1.18
19	3.76	3000000	4.25338E+11	4764088.59	1191022.15	1.19
20	3.13	3000000	2.95531E+11	3310157.22	827539.30	0.83
21	3.73	3000000	4.19131E+11	4694563.85	1173640.96	1.17
22	3.74	3000000	4.20819E+11	4713474.46	1178368.62	1.18
23	3.74	3000000	4.21383E+11	4719786.44	1179946.61	1.18
24	3.73	3000000	4.20256E+11	4707166.70	1176791.67	1.18
25	3.73	3000000	4.19131E+11	4694563.85	1173640.96	1.17
26	3.72	3000000	4.17446E+11	4675691.25	1168922.81	1.17
27	3.71	3000000	4.15204E+11	4650586.91	1162646.73	1.16
28	4.49	3000000	6.07242E+11	6801544.69	1700386.17	1.70
29	3.62	3000000	3.94213E+11	4415466.04	1103866.51	1.10
30	3.60	3000000	3.90948E+11	4378899.19	1094724.80	1.09
31	3.63	3000000	3.97491E+11	4452184.94	1113046.23	1.11
Average=	3.73					1.18

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

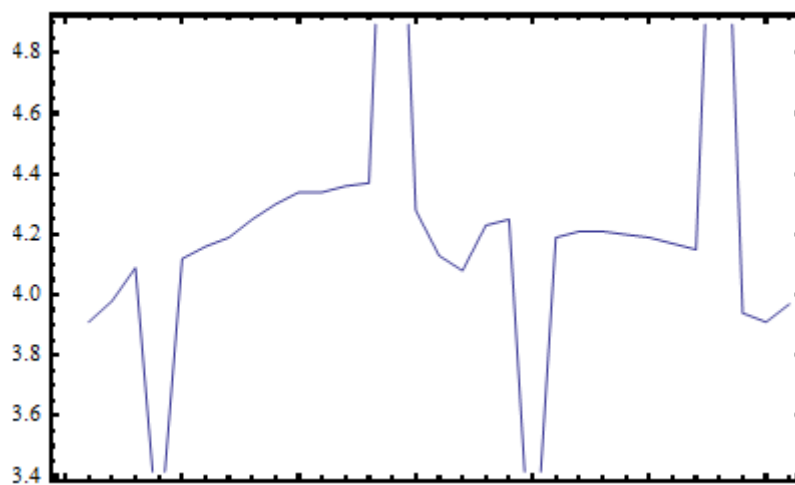| month/year	Aug-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.68	3000000	4.07407E+11	4563253.89	1140813.47	1.14
2	3.74	3000000	4.20819E+11	4713474.46	1178368.62	1.18
3	3.22	3000000	3.13418E+11	3510511.38	877627.84	0.88
4	3.71	3000000	4.15204E+11	4650586.91	1162646.73	1.16
5	3.75	3000000	4.23075E+11	4738747.74	1184686.93	1.18
6	3.78	3000000	4.29881E+11	4814973.02	1203743.25	1.20
7	3.80	3000000	4.36167E+11	4885380.46	1221345.12	1.22
8	3.82	3000000	4.39039E+11	4917552.79	1229388.20	1.23
9	3.82	3000000	4.39039E+11	4917552.79	1229388.20	1.23
10	3.82	3000000	4.40767E+11	4936906.86	1234226.72	1.23
11	3.83	3000000	4.43076E+11	4962771.42	1240692.86	1.24
12	3.84	3000000	4.43654E+11	4969248.12	1242312.03	1.24
13	4.57	3000000	6.2909E+11	7046258.48	1761564.62	1.76
14	3.69	3000000	4.09628E+11	4588121.71	1147030.43	1.15
15	3.62	3000000	3.94213E+11	4415466.04	1103866.51	1.10
16	3.65	3000000	4.01883E+11	4501379.98	1125344.99	1.13
17	3.67	3000000	4.05746E+11	4544647.37	1136161.84	1.14
18	3.05	3000000	2.81231E+11	3149984.26	787496.07	0.79
19	3.63	3000000	3.97491E+11	4452184.94	1113046.23	1.11
20	3.65	3000000	4.01333E+11	4495215.82	1123803.95	1.12
21	3.66	3000000	4.04641E+11	4532264.14	1133066.04	1.13
22	3.67	3000000	4.06853E+11	4557047.49	1139261.87	1.14
23	3.67	3000000	4.06853E+11	4557047.49	1139261.87	1.14
24	3.66	3000000	4.02985E+11	4513720.97	1128430.24	1.13
25	3.64	3000000	3.99135E+11	4470601.40	1117650.35	1.12
26	3.63	3000000	3.96397E+11	4439928.41	1109982.10	1.11
27	4.31	3000000	5.59496E+11	6266751.36	1566687.84	1.57
28	3.49	3000000	3.6637E+11	4103604.63	1025901.16	1.03
29	3.47	3000000	3.63746E+11	4074219.80	1018554.95	1.02
30	3.53	3000000	3.75892E+11	4210264.27	1052566.07	1.05
31	3.6	3000000	3.90948E+11	4378899.19	1094724.80	1.09
Average=	3.70					1.16

Sandwip Channel August 2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)
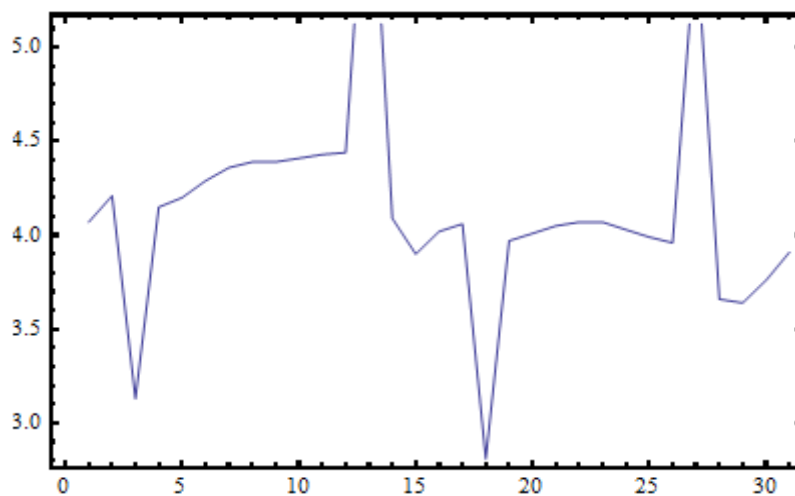
month/year	Sep-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.11	3000000	2.91766E+11	3267990.04	816997.51	0.82
2	3.57	3000000	3.83921E+11	4300192.62	1075048.15	1.08
3	3.61	3000000	3.92579E+11	4397163.61	1099290.90	1.10
4	3.65	3000000	4.01883E+11	4501379.98	1125344.99	1.13
5	3.68	3000000	4.07962E+11	4569464.51	1142366.13	1.14
6	3.69	3000000	4.11297E+11	4606816.93	1151704.23	1.15
7	3.69	3000000	4.11297E+11	4606816.93	1151704.23	1.15
8	3.70	3000000	4.12411E+11	4619301.52	1154825.38	1.15
9	3.72	3000000	4.16324E+11	4663130.63	1165782.66	1.17
10	3.71	3000000	4.14645E+11	4644321.39	1161080.35	1.16
11	4.47	3000000	6.0184E+11	6741042.00	1685260.50	1.69
12	3.53	3000000	3.76425E+11	4216229.93	1054057.48	1.05
13	3.45	3000000	3.59048E+11	4021593.18	1005398.30	1.01
14	3.47	3000000	3.63223E+11	4068355.50	1017088.88	1.02
15	3.50	3000000	3.68475E+11	4127188.51	1031797.13	1.03
16	2.85	3000000	2.45021E+11	2744414.25	686103.56	0.69
17	3.45	3000000	3.59048E+11	4021593.18	1005398.30	1.01
18	3.47	3000000	3.63746E+11	4074219.80	1018554.95	1.02
19	3.50	3000000	3.6953E+11	4139005.80	1034751.45	1.03
20	3.52	3000000	3.72705E+11	4174559.01	1043639.75	1.04
21	3.51	3000000	3.70587E+11	4150839.97	1037709.99	1.04
22	3.48	3000000	3.65844E+11	4097719.21	1024429.80	1.02
23	3.46	3000000	3.60611E+11	4039097.38	1009774.34	1.01
24	3.44	3000000	3.56969E+11	3998313.39	999578.35	1.00
25	3.43	3000000	3.54897E+11	3975101.17	993775.29	0.99
26	3.99	3000000	4.81045E+11	5388043.24	1347010.81	1.35
27	3.28	3000000	3.2503E+11	3640570.25	910142.56	0.91
28	3.32	3000000	3.33E+11	3729837.62	932459.41	0.93
29	3.40	3000000	3.47691E+11	3894390.55	973597.64	0.97
30	3.44	3000000	3.56969E+11	3998313.39	999578.35	1.00
Average=	3.54					1.06
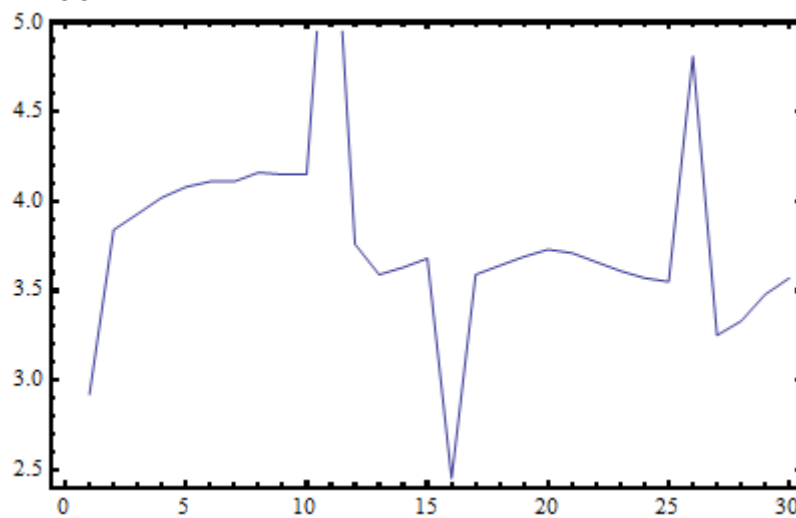
Sandwip Channel

September 2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

month/year	Oct-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.85	3000000	2.45021E+11	2744414.25	686103.56	0.69
2	3.41	3000000	3.50256E+11	3923120.74	980780.19	0.98
3	3.45	3000000	3.59568E+11	4027423.69	1006855.92	1.01
4	3.56	3000000	3.82846E+11	4288147.27	1072036.82	1.07
5	3.50	3000000	3.6953E+11	4139005.80	1034751.45	1.03
6	3.50	3000000	3.70059E+11	4144920.77	1036230.19	1.04
7	3.51	3000000	3.70587E+11	4150839.97	1037709.99	1.04
8	3.51	3000000	3.71645E+11	4162691.05	1040672.76	1.04
9	3.50	3000000	3.68475E+11	4127188.51	1031797.13	1.03
10	4.28	3000000	5.53449E+11	6199029.34	1549757.33	1.55
11	3.32	3000000	3.33E+11	3729837.62	932459.41	0.93
12	3.25	3000000	3.19116E+11	3574329.26	893582.32	0.89
13	3.27	3000000	3.21574E+11	3601855.76	900463.94	0.90
14	3.29	3000000	3.26517E+11	3657225.52	914306.38	0.91
15	3.34	3000000	3.36517E+11	3769232.09	942308.02	0.94
16	2.55	3000000	1.96153E+11	2197051.85	549262.96	0.55
17	3.29	3000000	3.26021E+11	3651669.54	912917.38	0.91
18	3.31	3000000	3.30499E+11	3701825.42	925456.36	0.93
19	3.32	3000000	3.33E+11	3729837.62	932459.41	0.93
20	3.31	3000000	3.30499E+11	3701825.42	925456.36	0.93
21	3.28	3000000	3.2503E+11	3640570.25	910142.56	0.91
22	3.26	3000000	3.20098E+11	3585327.19	896331.80	0.90
23	3.25	3000000	3.18626E+11	3568836.63	892209.16	0.89
24	3.24	3000000	3.16179E+11	3541436.83	885359.21	0.89
25	3.86	3000000	4.49458E+11	5034247.41	1258561.85	1.26
26	3.12	3000000	2.94116E+11	3294312.85	823578.21	0.82
27	3.12	3000000	2.92705E+11	3278506.49	819626.62	0.82
28	3.20	3000000	3.08415E+11	3454467.03	863616.76	0.86
29	3.27	3000000	3.22066E+11	3607373.73	901843.43	0.90
30	3.29	3000000	3.26517E+11	3657225.52	914306.38	0.91
31	3.3275	3000000	3.34003E+11	3741072.07	935268.02	0.94
Average=	3.34					0.95

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

month/year	Nov-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.61	3000000	2.04968E+11	2295783.57	573945.89	0.57
2	3.30	3000000	3.28007E+11	3673918.81	918479.70	0.92
3	3.31	3000000	3.30499E+11	3701825.42	925456.36	0.93
4	3.31	3000000	3.30499E+11	3701825.42	925456.36	0.93
5	3.31	3000000	3.3E+11	3696235.65	924058.91	0.92
6	3.30	3000000	3.28505E+11	3679491.68	919872.92	0.92
7	3.28	3000000	3.24535E+11	3635026.94	908756.73	0.91
8	3.24	3000000	3.16668E+11	3546908.35	886727.09	0.89
9	3.96	3000000	4.72251E+11	5289551.80	1322387.95	1.32
10	3.08	3000000	2.857E+11	3200044.88	800011.22	0.80
11	3.08	3000000	2.857E+11	3200044.88	800011.22	0.80
12	3.11	3000000	2.90829E+11	3257490.48	814372.62	0.81
13	3.16	3000000	3.00271E+11	3363246.30	840811.57	0.84
14	3.17	3000000	3.03611E+11	3400659.96	850164.99	0.85
15	2.42	3000000	1.76176E+11	1973301.52	493325.38	0.49
16	3.14	3000000	2.96949E+11	3326039.59	831509.90	0.83
17	3.14	3000000	2.97422E+11	3331342.17	832835.54	0.83
18	3.13	3000000	2.95531E+11	3310157.22	827539.30	0.83
19	3.12	3000000	2.92705E+11	3278506.49	819626.62	0.82
20	3.11	3000000	2.91766E+11	3267990.04	816997.51	0.82
21	3.11	3000000	2.91766E+11	3267990.04	816997.51	0.82
22	3.11	3000000	2.90829E+11	3257490.48	814372.62	0.81
23	3.09	3000000	2.88026E+11	3226093.16	806523.29	0.81
24	3.68	3000000	4.08517E+11	4575679.35	1143919.84	1.14
25	3.00	3000000	2.71039E+11	3035836.16	758959.04	0.76
26	2.99	3000000	2.69234E+11	3015614.16	753903.54	0.75
27	3.05	3000000	2.81077E+11	3148265.07	787066.27	0.79
28	3.15	3000000	2.98845E+11	3347275.23	836818.81	0.84
29	3.17	3000000	3.03133E+11	3395302.48	848825.62	0.85
30	3.19	3000000	3.0697E+11	3438280.56	859570.14	0.86
Average=	3.16					0.85
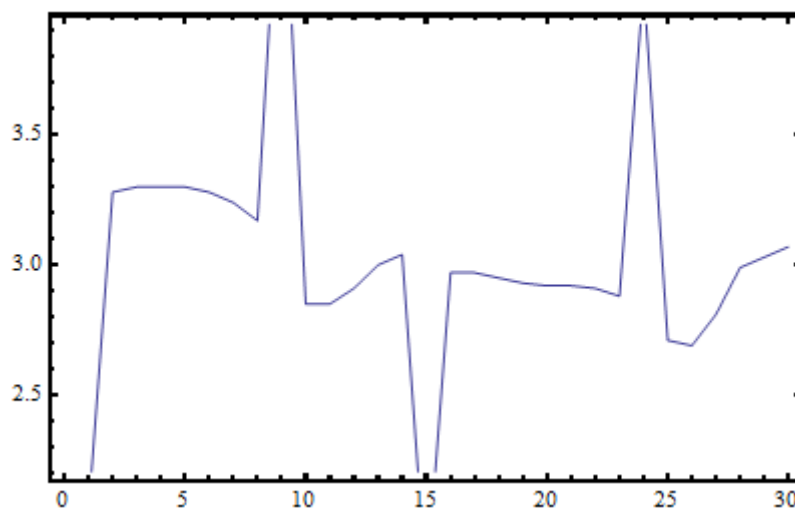
Sandwip Channel November 2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

month/year	Dec-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.39	3000000	1.7231E+11	1929993.06	482498.27	0.48
2	3.14	3000000	2.97896E+11	3336648.96	834162.24	0.83
3	3.15	3000000	2.9837E+11	3341959.98	835490.00	0.84
4	3.14	3000000	2.96949E+11	3326039.59	831509.90	0.83
5	3.12	3000000	2.94116E+11	3294312.85	823578.21	0.82
6	3.10	3000000	2.90361E+11	3252247.03	813061.76	0.81
7	3.07	3000000	2.84772E+11	3189655.13	797413.78	0.80
8	3.85	3000000	4.47906E+11	5016872.97	1254218.24	1.25
9	2.94	3000000	2.60741E+11	2920482.49	730120.62	0.73
10	2.92	3000000	2.57646E+11	2885818.32	721454.58	0.72
11	2.95	3000000	2.62073E+11	2935401.92	733850.48	0.73
12	2.99	3000000	2.68784E+11	3010569.22	752642.30	0.75
13	3.03	3000000	2.76949E+11	3102024.35	775506.09	0.78
14	2.40	3000000	1.73755E+11	1946177.42	486544.35	0.49
15	2.99	3000000	2.70136E+11	3025716.71	756429.18	0.76
16	2.99	3000000	2.70136E+11	3025716.71	756429.18	0.76
17	3.00	3000000	2.70588E+11	3030774.32	757693.58	0.76
18	3.01	3000000	2.72851E+11	3056125.73	764031.43	0.76
19	3.02	3000000	2.75124E+11	3081582.73	770395.68	0.77
20	3.03	3000000	2.76949E+11	3102024.35	775506.09	0.78
21	3.02	3000000	2.75579E+11	3086686.80	771671.70	0.77
22	3.01	3000000	2.72397E+11	3051047.01	762761.75	0.76
23	3.00	3000000	2.70588E+11	3030774.32	757693.58	0.76
24	3.62	3000000	3.94576E+11	4419538.41	1104884.60	1.10
25	2.92	3000000	2.57646E+11	2885818.32	721454.58	0.72
26	2.90	3000000	2.53257E+11	2836657.06	709164.27	0.71
27	2.94	3000000	2.60741E+11	2920482.49	730120.62	0.73
28	3.02	3000000	2.75124E+11	3081582.73	770395.68	0.77
29	3.03	3000000	2.76492E+11	3096907.61	774226.90	0.77
30	6.58	3000000	1.30475E+12	14614084.3	3653521.06	3.65
31	3.005	3000000	2.72397E+11	3051047.01	762761.75	0.76
Average=	3.14					0.87
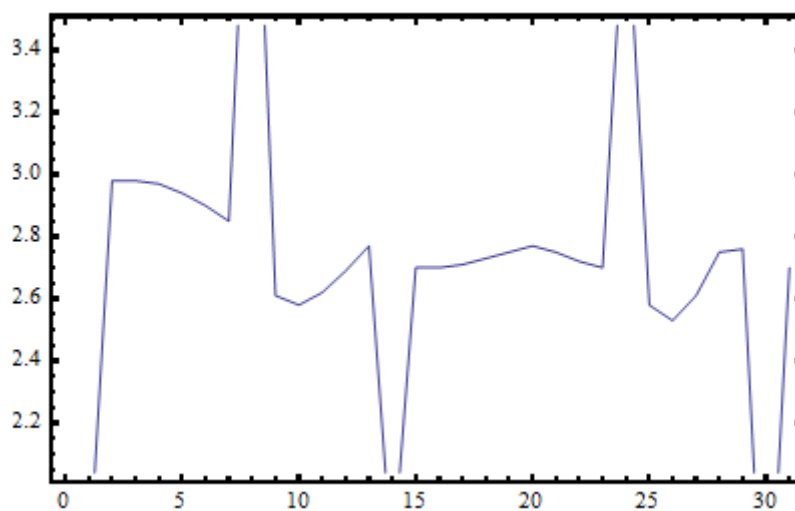
Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

Sandwip Channel December 2013

Actual & Max. tidal potential in Sandwip Channel during year 2013

Serial	Month	Max power potential (MW)	Actual power potential (MW)
1	January	2.92	0.73
2	February	2.84	0.71
3	March	3.12	0.78
4	April	3.28	0.82
5	May	3.88	0.97
6	June	4.44	1.11
7	July	4.72	1.18
8	August	4.64	1.16
9	September	4.24	1.06
10	October	3.80	0.95
11	November	3.40	0.85
12	December	3.48	0.87
Average		3.72	0.93
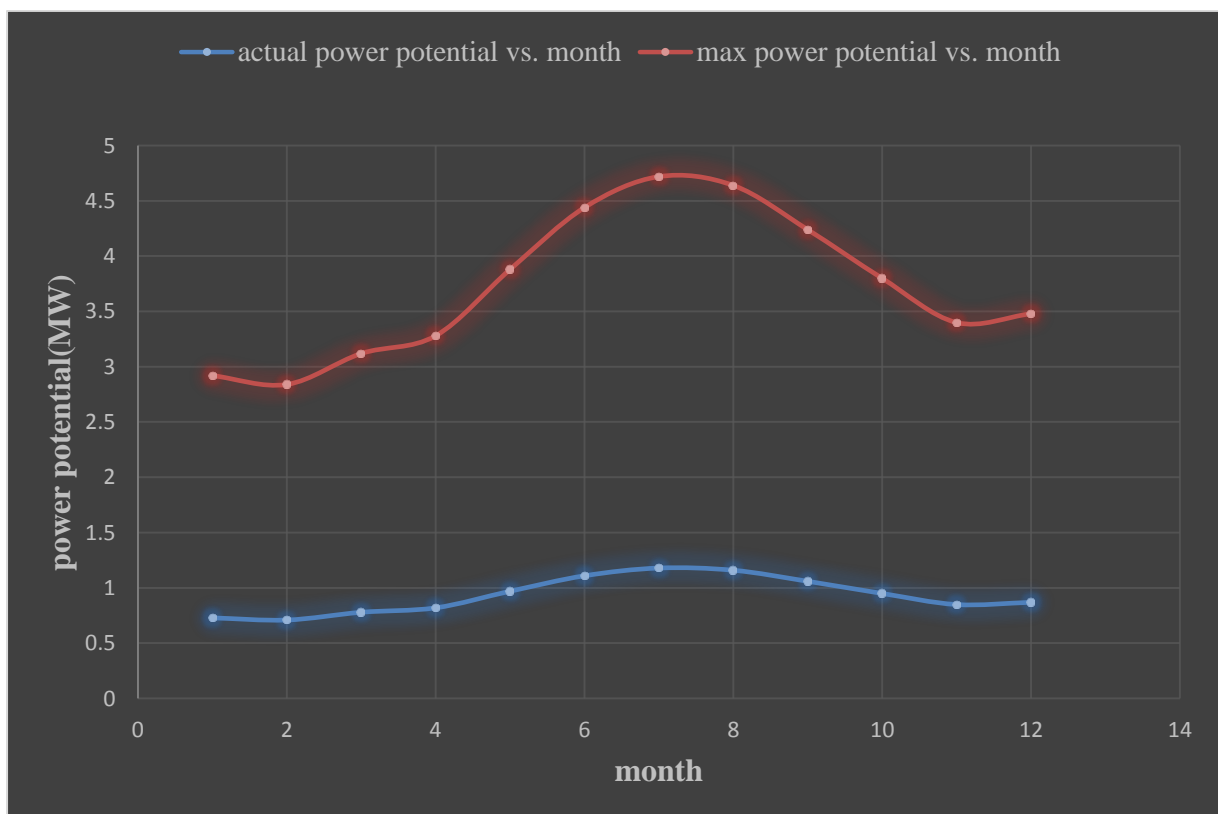
Actual & Max. Tidal Potential in Sandwip Channel During Year 2009

Serial	Month	Max power potential (MW)	Actual power potential (MW)
1	January	2.96	0.74
2	February	2.8	0.7
3	March	2.96	0.74
4	April	3.36	0.84
5	May	3.88	0.97
6	June	4.44	1.11
7	July	4.72	1.18
8	August	4.6	1.15
9	September	4.24	1.06
10	October	3.8	0.95
11	November	3.4	0.85
12	December	3.08	0.77
Average		3.69	0.92

Actual & Max. Tidal Potential in Sandwip Channel During Year 2005

Serial	Month	Max power potential (MW)	Actual power potential (MW)
1	January	3	0.75
2	February	2.76	0.69
3	March	3	0.75
4	April	3.28	0.82
5	May	3.84	0.96
6	June	4.44	1.11
7	July	4.72	1.18
8	August	4.6	1.15
9	September	4.24	1.06
10	October	3.76	0.94
11	November	3.4	0.85
12	December	3.12	0.78
Average		3.68	0.92
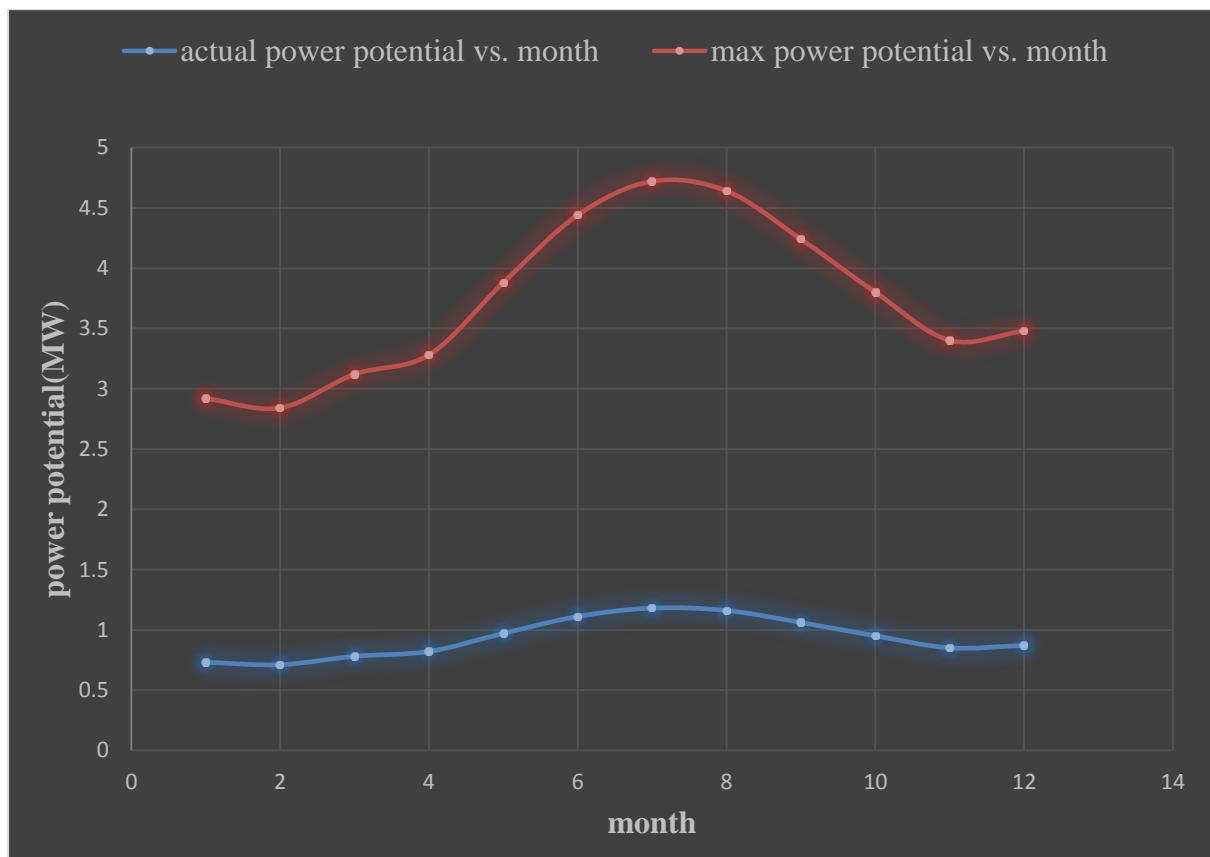
Actual & Max. Tidal Potential in Hiron Point During Year 2013

Serial	Month	Max power potential (MW)	Actual power potential (MW)
1	January	0.68	0.17
2	February	0.52	0.13
3	March	0.92	0.23
4	April	0.76	0.19
5	May	1	0.25
6	June	1.2	0.3
7	July	1.28	0.32
8	August	1.32	0.33
9	September	1.28	0.32
10	October	1.24	0.31
11	November	1.08	0.27
12	December	0.84	0.21
Average		1.01	0.25
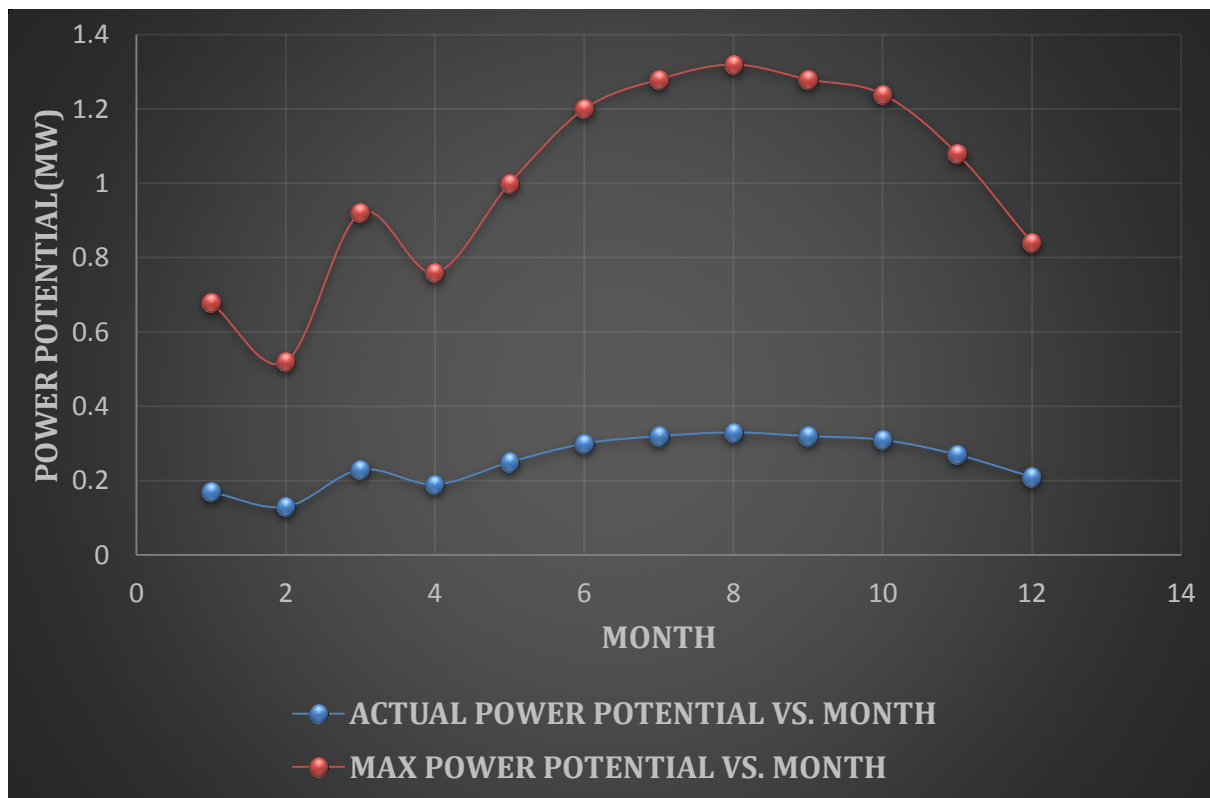
Actual & Max. Tidal Potential in Hiron Point During Year 2009

Serial	Month	Max power potential (MW)	Actual power potential (MW)
1	January	0.68	0.17
2	February	0.56	0.14
3	March	0.6	0.15
4	April	0.8	0.2
5	May	1	0.25
6	June	1.2	0.3
7	July	1.28	0.32
8	August	1.28	0.32
9	September	1.32	0.33
10	October	1.24	0.31
11	November	1.08	0.27
12	December	0.84	0.21
Average		0.99	0.25

Actual & Max. Tidal Potential in Hiron Point During Year 2005

Serial	Month	Max power potential (MW)	Actual power potential (MW)
1	January	0.64	0.16
2	February	0.52	0.13
3	March	0.6	0.15
4	April	0.76	0.19
5	May	1	0.25
6	June	1.2	0.3
7	July	1.28	0.32
8	August	1.28	0.32
9	September	1.32	0.33
10	October	1.24	0.31
11	November	1.08	0.27
12	December	0.84	0.21
Average		0.98	0.24

Actual & Max. Tidal Potential in Khepupara During Year 2013

Serial	Month	Max power potential (MW)	Actual power potential (MW)
1	January	0.68	0.17
2	February	0.68	0.17
3	March	0.92	0.23
4	April	1.28	0.32
5	May	1.6	0.4
6	June	1.88	0.47
7	July	2.04	0.51
8	August	2.08	0.52
9	September	1.92	0.48
10	October	1.64	0.41
11	November	1.2	0.3
12	December	0.84	0.21
Average		1.39	0.35

Actual & Max. Tidal Potential in Khepupara During Year 2009

Serial	Month	Max power potential (MW)	Actual power potential (MW)
1	January	0.68	0.17
2	February	0.72	0.18
3	March	0.92	0.23
4	April	1.28	0.32
5	May	1.6	0.4
6	June	1.88	0.47
7	July	2.04	0.51
8	August	2.08	0.52
9	September	1.96	0.49
10	October	1.64	0.41
11	November	1.2	0.3
12	December	0.84	0.21
Average		1.40	0.35

Actual & Max. Tidal Potential in Khepupara During Year 2005

Serial	Month	Max power potential (MW)	Actual power potential (MW)
1	January	0.68	0.17
2	February	0.72	0.18
3	March	0.92	0.23
4	April	1.24	0.31
5	May	1.64	0.41
6	June	1.88	0.47
7	July	2.04	0.51
8	August	2.08	0.52
9	September	1.96	0.49
10	October	1.64	0.41
11	November	1.2	0.3
12	December	0.84	0.21
Average		1.40	0.35

5.2 Geographical & data analysis

Our main objective was to analyze the tidal energy potential and identifying some potential sites in coastal areas of Bangladesh. According to our analysis we have compared energy potential between Hiron point, Khepupara and Sandwip.

5.2.1 Sandwip Channel

Swandip is an island along the south eastern coast of Bangladesh. Swandip is a sub-division of Chittagong district located at 22.490513°N 91.421185°E. It is situated at the estuary of the Meghan River on the Bay of Bengal and separated from the Chittagong coast by the Swandip channel. The entire island is 50 kilometers long and 5-15 kilometers wide with an area of 762.42 km2. Swandip has a very large potential for tidal power generation with a tidal variation of 3-4 m. A flood control barrage exists around the entire island and this contains 28 sluice gates. Considering each sluice gate is capable for one turbine and one generator, a very large amount of power can be generated from Swandip.
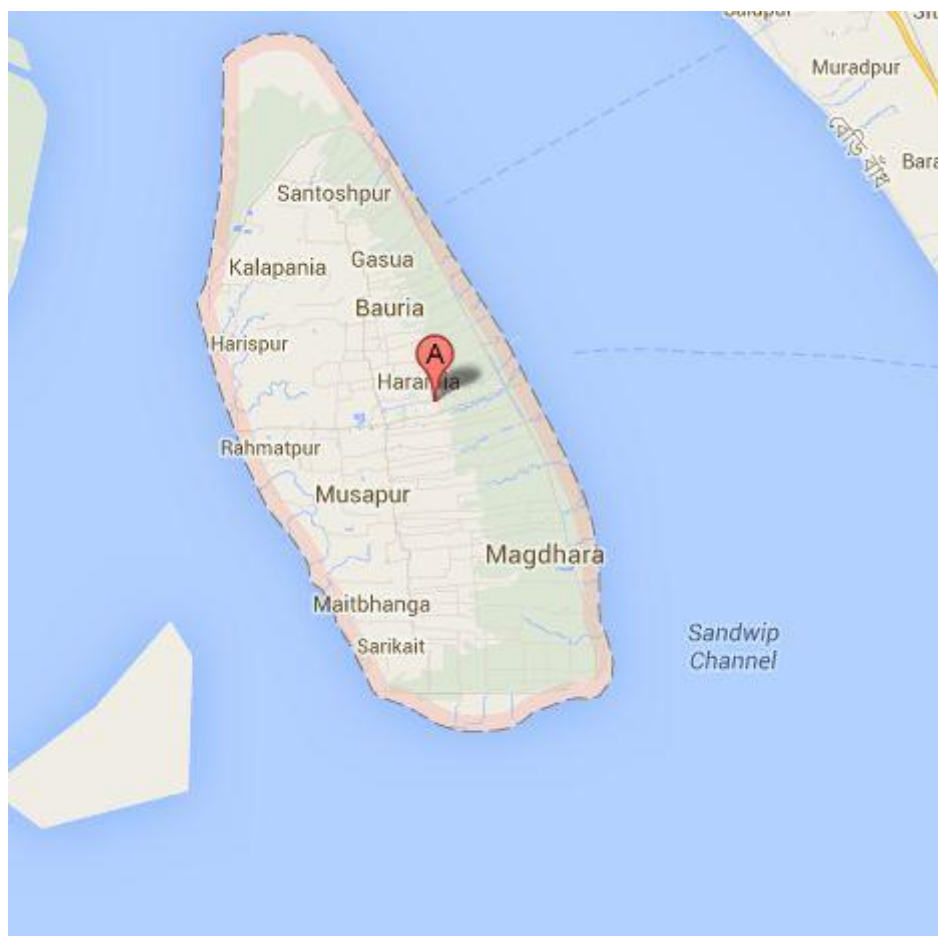
Figure 5.1: Google map view of Sandwip channel.

The maximum power potential during the year 2013 is about 3.72 MW and actual power potential that can be harnessed is about 0.93 MW. The average potential energy is about 3.3E+11 J.

Figure 5.2: Google earth view of Sandwip channel.

If we observe the power potential vs. month curve than we will see that for both actual power potential and maximum power potential curve first moves upward, then it reaches the peak value at the month July then again moves downward.

5.2.2 Khepupara

Khepupara (also known as kalapara) is located at Patuakhali District in the Division of Barisal, The average tidal height throughout the year 2013 is about 1.4-1.6 m. Maximum available power potential throught the year is about 1.39 MW & actual power potential is about 0.35 MW throughout the year, the potential energy for the year 2013 is approx. about 1.25E+11 J. If we observe the power potential vs. month curve than we will see that for both actual power potential and maximum power potential curve it is first upward, then it reaches the peak value at the month august then again moves downward.

Figure 5.3: Google earth view of Khepupara.

Here we have suggested 2 spots, the latitude is 21°46'38.44"N and longitude is 90° 6'12.42"E.The latitude for spot 2 is 21°54'2.12"N and longitude is 89°55'46.05"E.As the location of this areas are at the north-east part of the country so the tidal potential in this areas are well enough.

Figure 5.4: Google map view of Khepupara.

5.2.3 Hiron point

Hiron point is located at the north-east region of the country near the mangrove forest in Khulna division. The tidal range throughout the year 2013 is about 1.2-2 m. The potential energy during 2013 is about 9.04E+10 J. Maximum power potential is about 1.01 MW and actual power potential is about 0.25 MW.

Figure 5.5: Google earth view of Hiron point.

If we observe the power potential vs. month curve than we will see that for both actual power potential and maximum power potential curve it moves upward, then it reaches the peak value at the month august again moves downward.

Figure 5.6: Google map view of Hiron point.

5.3 Result

From the above analysis we see that Sandwip is the most potential area from where we can harness large amount of potential energy to produce electricity by rotating a turbine through a generator. After Sandwip, Hiron point will be the second choice and then Khepupara.

CHAPTER VI

CHOICE of WATER TURBINE

The choice of water turbine depends on the site conditions, notably on the head of water h and the water flow rate Q. Figure 4.8 indicates which turbine is most suitable for any particular combination of head and flow rate. Impulse turbines are suited for large h and a low Q, e.g. fast moving mountain streams. Kaplan turbines are suited for low h and large Q (e.g. run-of-river sites) and Francis turbines are usually preferred for large Q and large h, e.g. dams. A useful parameter for choosing the most suitable turbine is the shape (or type) number S, described below. [12]
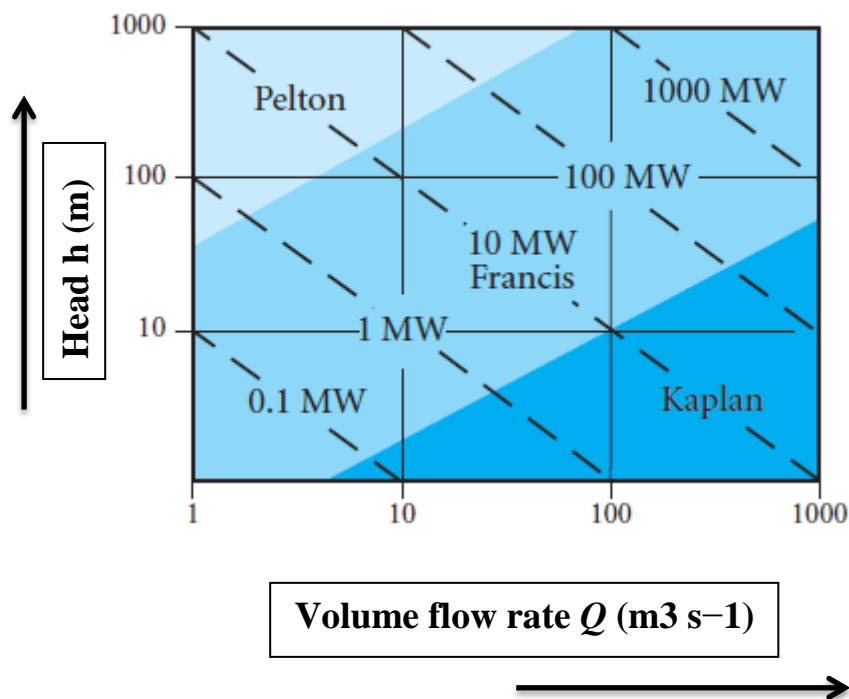
Figure 6.1: Choice of turbine in terms of head h and volume flow rate Q

6.1 Shape or type number

Dimensional analysis is a useful means for choosing the appropriate type of turbine for a particular combination of h and Q. The power output P from a turbine depends on the head h, the angular velocity x and diameter D of the turbine, and the density of water q. Various dimensionless parameters can be formed from these physical quantities, the power coefficient

$K_P = P/(\omega^3 D^5 q)$ and the head coefficient $K_h = gh/\omega^2 D^2$ being particularly useful ones. When a turbine of a particular design is operating at its maximum efficiency, K_P and K_h will have particular values which can be used to predict the power and head in terms of the diameter D and the angular velocity x. [12] We can eliminate the dependence on D (which determines the size of the turbine) by forming the dimensionless ratio

$$S = \frac{Kp1/2}{Kh5/4}$$

$$= \frac{\omega P1/2}{\rho 1/2(gh)5/4} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(4.1)}$$

Called the shape or type number. Substituting $P = \eta\rho ghQ$ and assuming $g = 1$,

Equation (4.1) becomes,

$$S = \frac{\omega Q1/2}{(gh)3/4}$$

Putting $Q = V_w A$, $gh = \frac{1}{2} V_w^2$

Where $A = \pi r^2$ is the inlet area and V_w is the speed of the water

And, $\omega = 2\pi f = 2\pi\left(\dfrac{Vb}{2\pi R}\right) = \dfrac{Vb}{R}$

Where V_b is the speed of the blade tip of radius R.

Then we have,

$$S = \frac{\frac{Vb}{R}(Vw\pi r2)^{1/2}}{\left(\frac{1}{2}Vw2\right)3/4} = 2^{3/2}\,\pi^{1/2}\,\frac{r}{R} \approx 5\,\frac{r}{R}\,\frac{Vb}{Vw}$$

For a Pelton turbine $r/R \sim 0.1$, $Vb/Vw \approx 0.5$, and $S \sim 0.25$; for a Kaplan turbine $r \sim R$ and

$Vb \sim Vw$, so $S \sim 5$, while for a Francis turbine $S \sim 1$.

6.2 Turbine selection for small low-head

The development of a low-head small hydro site is difficult at the best of times. Low head means low power per unit of flow, and hence a relatively higher cost than for sites with higher heads. Also small power plants suffer from the inverse scale effect, with higher costs

relative to larger sites. Hence, all means possible are needed to arrive at an economic development. Many entrepreneurs are under the impression that any rapids in a river can be developed as an economical source of power. Unfortunately, this is not the case, and to assist such developers in assessing whether the site is worth investigating, a simple screening program is attached to the turbine selection program. Data for both the screening and turbine programs can be obtained from a short site inspection, and some analysis of flow records.

As in our country the water head is very low in most of the river, for this reason it is very convenient to use very low head turbine. The mostly used very low head turbine is inclined axis, very low head Kaplan gear turbine. [13]

6.2.1 Inclined axis, very low head Kaplan gear turbine

The turbine axis is usually inclined at an angle of 15 to 45 degrees to the horizontal. It is primarily intended for use in very low head sites, where the net head is between 2 and 8 meters. Maximum unit capacity is about 2.6MW. The bevel gear bulb turbine has – a bulb within the water passage with turbine thrust bearing and right angle gear drive; stay vanes and wicket gates;
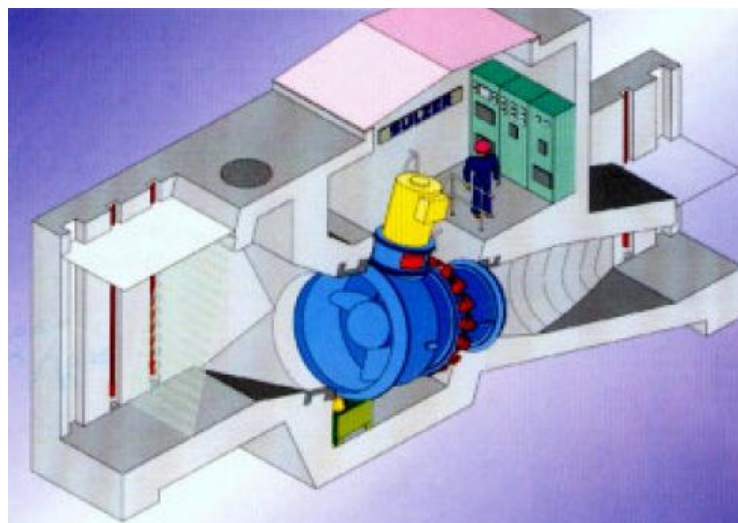
Figure 6.2: Illustration of inclined axis, very low head Kaplan gear turbine unit.

Kaplan runner and bent cone draft tube. The generator is mounted above the right angle gearbox. A typical layout is included in figure. [13]

CHAPTER VII

CHALLENGES to DEVELOPMENT

7.1 Corrosion

Corrosion is defined as it is the electrochemical oxidation of a metal. Corrosion can be explained as reversion of any metal to its ore form. Marine corrosion depends on numerous factors such as temperature, galvanic interactions, alloy surface films, biofouling, water chemistry, alloy composition, microbiological organisms, geometry and surface roughness etc. [24]. It is vital to understand how these factors affect marine corrosion to design a robust support structure for tidal current turbine. Generally, corrosion in seawater accelerates with increase in temperature. Other catalysts such as concentration of oxygen and marine biological activity should also be considered. The solubility of oxygen decreases with the increase in temperature. Corrosion of metals in seawater is also affected by the turbulent or laminar flow. Corrosion rate may accelerate with fluid flow by taking off the protective film or migration of deleterious species or by enhancing diffusion. On the other hand, increased fluid flow may also help decrease corrosion by removing the aggressive ions that begins to accumulate on metal surface. Generally, cavitation and erosion-corrosion are forms of flow influenced corrosion. [14]

7.2 Cavitation

Cavitation occurs in liquids flowing at high velocity, causing a pressure drop after a body that leads to formation of vapor bubbles. When the static pressure of the liquid falls below the vapor pressure cavitation phenomena starts. The liquid pressure has two components, static and dynamic. Dynamic pressure is due to liquid flow velocity and static pressure is the actual fluid pressure. Formation of vapor bubble or boiling is a function of static pressure. Cavitation mostly occurs near the fast moving blades of the turbine. The reason being fast moving blades, local dynamic head increases and thus static pressure falls. Bubble formation in cavitation is not the major issue, the major issue is the breakdown of these bubbles as they generate high frequency pressure wave which is very damaging. The breakdown of these bubbles near the blade surface causes erosion on the surface, also termed as cavitation erosion. Small sized bubbles only damage the blade surface of the blade and do not cause

efficiency drop. Large sized bubbles reduce the efficiency of the turbine, since big size bubbles disturb the fluid flow and cause flow separation. [14]

7.3 Extreme Loading conditions

Tidal current turbines are exposed to extreme structural loading conditions in marine environment. Seawater has a density of approximately 1025 kg/m3 so the forces acting on the turbine and support structure are enormous. Turbines facing the flow direction of seawater are exposed to a thrust force while extracting kinetic energy from the flow stream. As the blades of the turbine rotate to extract the available energy, there is a change in momentum between the upside and downside of the turbine. This change in momentum exerts a force on the turbine and its support structure. This thrust force has to be absorbed by the support structure. The thrust force encountered by tidal current turbines is expressed as:

$$T_{max} = 0.5 \; \rho A C_t V^2_{max}$$

Where ρ is the density of the fluid, A is the cross sectional area, Ct is the thrust coefficient. [14]

CHAPTER VIII

CONCLUSION & RECOMMENDATIONS

8.1 Conclusions

Comparing with wind power energy and solar energy, tidal power seems not a big sustainable resource, but it is doing a fast-rate progress in recent decades. I can see a bright future of the tidal power and wave power (we can call them ocean energy) when we fix several problems. First we have to make the cost lower, so that it can be built in a large scale, hopefully, within six years of operation, the Blue Energy system will generate electricity at a competitive rate of $US 0.04 per kWh, constantly trending downward; Secondly, the turbine has to be more effective, technology of its working process should be fully developed. [15]

Due to depleting fossil fuel resources, their rising cost ; the world is obligated to find alternate energy resources. Also this form of RE is less harmful to the environment as little or no siltation, less noise emission and produces no greenhouse gases or any solid waste. Significant development of tidal energy technology has been stimulated in the past 30 years particularly in France, the United Kingdom, Canada, and the former Soviet Union. [16]

In Bangladesh, there is some movement towards RE and it is suggested that tidal power has the highest potential. However, there is an urgent need for increased research and development of tidal energy and other sources of renewable energies. Though tidal power schemes may be cost effective in a commercial sense over their respective lifetimes, strikingly much of the costs are up-front and concerned with construction. This initial high cost is probably one of the critical factors as to why tidal schemes have not yet been pursued to any great degree. The installation of a tidal generator will impact its surrounding area by changing the behavior of currents and waves, which will, in turn, change existing sediment transport regimes. But modern appropriate technologies could mitigate the potential environmental impacts. It must be understood that the exploitation of all types of energy sources incurs environmental impact. Environmental aspects of tidal can be minimal especially in Bangladesh.

8.2 Recommendations

8.2.1 Insufficient proper data

Data is not available in BIWTA. So the Government should be concerned about the large possibility of harnessing tidal power so there should be easy accessibility for proper data.

8.2.3 Channel selection

A major challenge is that a demonstration project would yield almost no power, even at a dam length of 1km or so, because the power generation capacity increases as the square of the dam length (both head and volume increase in a more or less linear manner for increased dam length, resulting in a quadratic increase in power generation). Economic viability is estimated to be reached for dam lengths of about 30 km. Other concerns include: shipping routes, marine ecology, sediments, and stormsurges. Amidst the great number of challenges and few environmental impacts the method of utilizing tidal power to generate electricity has great potential and is certainly a technology most of the countries will try to harness in near future.

8.2.4 Environmental concerns

The engineering of the coast is likely to be very controversial. The coast is important ecologically and socially and is (like most environmental boundaries) susceptible to change. Any engineering system on the coast raises significant questions.

8.2.5 High capital costs

Moving large amounts of coastal material so that the potential energy of tides can be tapped is inevitably going to involve high capital costs. Hydroelectricity generally involves high capital costs and coastal environments (being susceptible to change) are likely to need even more engineering.

8.2.6 Turbine selection

Turbine selection is an important matter. For low head one type of Turbine &for high head another type of turbine. Where turbine is setup that ensure that not destroyed by animal & Ship. Turbine is above the load center that reduces the transmission loss. Turbine should design in such way that works in two directions.

8.2.8 Resolving the Problems with Tidal Power

8.2.8.1 Using small scale technologies

A range of small scale tidal systems are now beginning to appear. These are tidal fences, tidal turbines and tidal mills. These systems have both lower capital cost and less environmental impact. They can also fit into small flood control channels like mini-hydro systems. The problem with these small scale technologies is that mostly they do not develop the potential energy of a head of water that barrages provide. This means that they produce very little power. However, it is possible to link many small units in a geographically dispersed area if there is variation in tidal range across that area. The obvious application of small scale systems is to low income communities with no power (or very little power) and is very much applicable to coastal Bangladesh. For example, Alaska has significant tidal ranges along its southern coastline, making it an attractive site, particularly around Cook Inlet. Alaska's economy is narrowly based on its oil and gas revenues, which have been declining in recent years. Forward-think government and business leaders see the vast potential of tidal power at Cook Inlet as a means of attracting new business and broadening the base of Alaska's economy. Cheap, pollution free electricity is attractive to many industrial users and it offers a strong job-creation potential

8.2.8.2 Resolving environmental concerns

The key ways to ease environmental concerns are to:

➢ Involve the local community;

➢ Ensure all key impacts are manageable on a scientific basis; and

➢ Establish a global perspective as it is the global environment which is a major beneficiary of renewables.

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APPENDIX

AI: Calculation for Sandwip Channel during Year 2009

month/year	Jan-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.03	3000000	2.76035E+11	3091795.10	772948.77	0.77
2	3.02	3000000	2.75124E+11	3081582.73	770395.68	0.77
3	3.67	3000000	4.05562E+11	4542582.33	1135645.58	1.14
4	2.94	3000000	2.60741E+11	2920482.49	730120.62	0.73
5	2.88	3000000	2.50641E+11	2807363.04	701840.76	0.70
6	2.90	3000000	2.53257E+11	2836657.06	709164.27	0.71
7	3.72	3000000	4.16885E+11	4669408.83	1167352.21	1.17
8	2.96	3000000	2.63408E+11	2950359.35	737589.84	0.74
9	2.18	3000000	1.42922E+11	1600824.78	400206.20	0.40
10	2.92	3000000	2.56765E+11	2875952.28	718988.07	0.72
11	2.92	3000000	2.57646E+11	2885818.32	721454.58	0.72
12	2.93	3000000	2.58528E+11	2895701.25	723925.31	0.72
13	2.94	3000000	2.60741E+11	2920482.49	730120.62	0.73
14	2.94	3000000	2.60741E+11	2920482.49	730120.62	0.73
15	2.94	3000000	2.59855E+11	2910557.32	727639.33	0.73
16	3.68	3000000	4.07777E+11	4567393.83	1141848.46	1.14
17	2.85	3000000	2.44592E+11	2739601.60	684900.40	0.68
18	2.81	3000000	2.37345E+11	2658432.74	664608.19	0.66
19	2.77	3000000	2.31877E+11	2597186.01	649296.50	0.65
20	2.78	3000000	2.33133E+11	2611256.52	652814.13	0.65
21	2.81	3000000	2.37768E+11	2663173.59	665793.40	0.67
22	2.38	3000000	1.7135E+11	1919241.03	479810.26	0.48
23	2.83	3000000	2.40742E+11	2696477.81	674119.45	0.67
24	2.86	3000000	2.45882E+11	2754052.22	688513.06	0.69
25	2.90	3000000	2.5282E+11	2831764.17	707941.04	0.71
26	2.94	3000000	2.61184E+11	2925451.41	731362.85	0.73
27	2.98	3000000	2.67435E+11	2995459.74	748864.93	0.75
28	2.99	3000000	2.70136E+11	3025716.71	756429.18	0.76
29	3.00	3000000	2.70588E+11	3030774.32	757693.58	0.76
30	3.00	3000000	2.71492E+11	3040902.22	760225.55	0.76
31	3.0025	3000000	2.71944E+11	3045972.50	761493.12	0.76
Average=	2.95					0.74
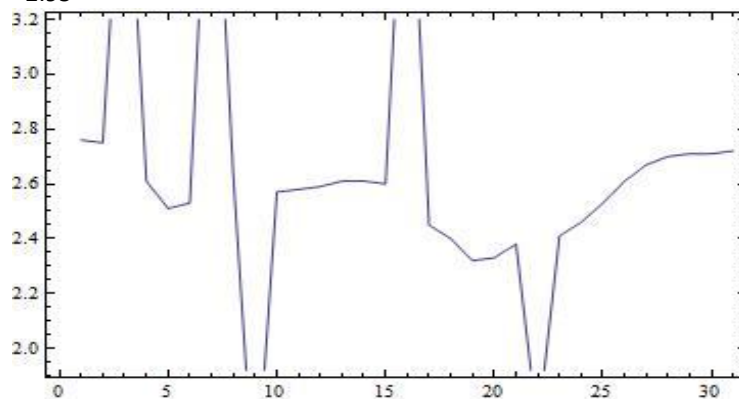
Sandwip Channel January 2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

month/year	Feb-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.73	3000000	4.20444E+11	4709268.82	1177317.20	1.18
2	2.91	3000000	2.55008E+11	2856270.88	714067.72	0.71
3	2.81	3000000	2.38616E+11	2672667.96	668166.99	0.67
4	2.77	3000000	2.30624E+11	2583153.52	645788.38	0.65
5	2.84	3000000	2.42877E+11	2720393.24	680098.31	0.68
6	2.84	3000000	2.42877E+11	2720393.24	680098.31	0.68
7	2.09	3000000	1.31767E+11	1475885.00	368971.25	0.37
8	2.67	3000000	2.15452E+11	2413211.43	603302.86	0.60
9	2.86	3000000	2.45882E+11	2754052.22	688513.06	0.69
10	2.89	3000000	2.51947E+11	2821991.05	705497.76	0.71
11	2.91	3000000	2.55886E+11	2866103.13	716525.78	0.72
12	2.92	3000000	2.57205E+11	2880883.19	720220.80	0.72
13	2.91	3000000	2.55447E+11	2861184.90	715296.22	0.72
14	2.90	3000000	2.5282E+11	2831764.17	707941.04	0.71
15	3.59	3000000	3.88058E+11	4346522.97	1086630.74	1.09
16	2.77	3000000	2.31041E+11	2587826.79	646956.70	0.65
17	2.71	3000000	2.2154E+11	2481410.00	620352.50	0.62
18	2.68	3000000	2.16662E+11	2426775.12	606693.78	0.61
19	2.75	3000000	2.27714E+11	2550558.85	637639.71	0.64
20	2.86	3000000	2.46744E+11	2763707.09	690926.77	0.69
21	2.28	3000000	1.57272E+11	1761564.62	440391.16	0.44
22	2.83	3000000	2.42022E+11	2710814.39	677703.60	0.68
23	2.89	3000000	2.52383E+11	2826875.50	706718.87	0.71
24	2.95	3000000	2.62963E+11	2945369.32	736342.33	0.74
25	3.00	3000000	2.70588E+11	3030774.32	757693.58	0.76
26	3.01	3000000	2.72851E+11	3056125.73	764031.43	0.76
27	3.02	3000000	2.74213E+11	3071387.26	767846.82	0.77
28	3.03	3000000	2.76035E+11	3091795.10	772948.77	0.77
Average=	3.0025					0.70

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

month/year	Mar-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.03	3000000	2.76492E+11	3096907.61	774226.90	0.77
2	3.00	3000000	2.71944E+11	3045972.50	761493.12	0.76
3	3.67	3000000	4.06299E+11	4550845.32	1137711.33	1.14
4	2.80	3000000	2.35656E+11	2639511.57	659877.89	0.66
5	2.75	3000000	2.27714E+11	2550558.85	637639.71	0.64
6	2.82	3000000	2.39465E+11	2682179.23	670544.81	0.67
7	2.86	3000000	2.46313E+11	2758877.54	689719.39	0.69
8	2.14	3000000	1.38147E+11	1547346.20	386836.55	0.39
9	2.85	3000000	2.44592E+11	2739601.60	684900.40	0.68
10	2.90	3000000	2.5282E+11	2831764.17	707941.04	0.71
11	2.95	3000000	2.61628E+11	2930424.55	732606.14	0.73
12	2.98	3000000	2.66986E+11	2990431.69	747607.92	0.75
13	2.97	3000000	2.66537E+11	2985407.86	746351.97	0.75
14	2.95	3000000	2.61628E+11	2930424.55	732606.14	0.73
15	2.93	3000000	2.58087E+11	2890757.67	722689.42	0.72
16	2.91	3000000	2.55008E+11	2856270.88	714067.72	0.71
17	3.51	3000000	3.71645E+11	4162691.05	1040672.76	1.04
18	2.76	3000000	2.30207E+11	2578484.47	644621.12	0.64
19	2.73	3000000	2.25234E+11	2522785.27	630696.32	0.63
20	2.81	3000000	2.37345E+11	2658432.74	664608.19	0.66
21	2.91	3000000	2.55447E+11	2861184.90	715296.22	0.72
22	2.98	3000000	2.67884E+11	3000492.01	750123.00	0.75
23	2.32	3000000	1.62831E+11	1823824.28	455956.07	0.46
24	3.00	3000000	2.70588E+11	3030774.32	757693.58	0.76
25	3.06	3000000	2.81999E+11	3158587.25	789646.81	0.79
26	3.10	3000000	2.88958E+11	3236542.04	809135.51	0.81
27	3.11	3000000	2.91766E+11	3267990.04	816997.51	0.82
28	3.12	3000000	2.93645E+11	3289039.84	822259.96	0.82
29	3.12	3000000	2.94116E+11	3294312.85	823578.21	0.82
30	3.12	3000000	2.92705E+11	3278506.49	819626.62	0.82
31	3.085	3000000	2.87094E+11	3215661.18	803915.29	0.80
Average=	2.94					0.74

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

Sandwip Channel March 2009

month/year	Apr-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.75	3000000	4.2496E+11	4759860.42	1189965.11	1.19
2	2.89	3000000	2.51512E+11	2817110.82	704277.71	0.70
3	2.89	3000000	2.51947E+11	2821991.05	705497.76	0.71
4	2.94	3000000	2.59855E+11	2910557.32	727639.33	0.73
5	3.00	3000000	2.71944E+11	3045972.50	761493.12	0.76
6	2.31	3000000	1.60967E+11	1802950.92	450737.73	0.45
7	3.02	3000000	2.74213E+11	3071387.26	767846.82	0.77
8	3.07	3000000	2.83846E+11	3179282.27	794820.57	0.79
9	3.11	3000000	2.91766E+11	3267990.04	816997.51	0.82
10	3.12	3000000	2.94116E+11	3294312.85	823578.21	0.82
11	3.11	3000000	2.90829E+11	3257490.48	814372.62	0.81
12	3.08	3000000	2.86164E+11	3205246.09	801311.52	0.80
13	3.07	3000000	2.83384E+11	3174102.18	793525.55	0.79
14	3.06	3000000	2.81999E+11	3158587.25	789646.81	0.79
15	3.05	3000000	2.80617E+11	3143110.32	785777.58	0.79
16	3.55	3000000	3.7945E+11	4250115.11	1062528.78	1.06
17	2.95	3000000	2.62073E+11	2935401.92	733850.48	0.73
18	3.00	3000000	2.71039E+11	3035836.16	758959.04	0.76
19	3.15	3000000	2.9837E+11	3341959.98	835490.00	0.84
20	3.19	3000000	3.06489E+11	3432893.52	858223.38	0.86
21	3.25	3000000	3.17646E+11	3557864.04	889466.01	0.89
22	2.58	3000000	2.00795E+11	2249051.28	562262.82	0.56
23	3.27	3000000	3.22559E+11	3612895.92	903223.98	0.90
24	3.30	3000000	3.28007E+11	3673918.81	918479.70	0.92
25	3.31	3000000	3.29501E+11	3690650.11	922662.53	0.92
26	3.30	3000000	3.29003E+11	3685068.78	921267.20	0.92
27	3.30	3000000	3.28505E+11	3679491.68	919872.92	0.92
28	3.28	3000000	3.24535E+11	3635026.94	908756.73	0.91
29	3.26	3000000	3.19607E+11	3579826.11	894956.53	0.89
30	3.94	3000000	4.67489E+11	5236212.12	1309053.03	1.31
Average=	3.13					0.84

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

Sandwip Channel

April

2009

month/year	May-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.12	3000000	2.93645E+11	3289039.84	822259.96	0.82
2	3.14	3000000	2.96476E+11	3320741.24	830185.31	0.83
3	3.17	3000000	3.02655E+11	3389949.22	847487.31	0.85
4	3.24	3000000	3.15691E+11	3535969.55	883992.39	0.88
5	3.29	3000000	3.26021E+11	3651669.54	912917.38	0.91
6	2.64	3000000	2.09713E+11	2348931.78	587232.94	0.59
7	3.32	3000000	3.32499E+11	3724226.73	931056.68	0.93
8	3.34	3000000	3.36013E+11	3763591.64	940897.91	0.94
9	3.34	3000000	3.3551E+11	3757955.41	939488.85	0.94
10	3.32	3000000	3.31998E+11	3718620.07	929655.02	0.93
11	3.31	3000000	3.30499E+11	3701825.42	925456.36	0.93
12	3.31	3000000	3.30998E+11	3707419.41	926854.85	0.93
13	3.32	3000000	3.31998E+11	3718620.07	929655.02	0.93
14	3.32	3000000	3.32499E+11	3724226.73	931056.68	0.93
15	3.87	3000000	4.51011E+11	5051651.88	1262912.97	1.26
16	3.27	3000000	3.22066E+11	3607373.73	901843.43	0.90
17	3.27	3000000	3.23053E+11	3618422.34	904605.59	0.90
18	3.36	3000000	3.39546E+11	3803163.49	950790.87	0.95
19	3.47	3000000	3.627E+11	4062495.43	1015623.86	1.02
20	3.51	3000000	3.71645E+11	4162691.05	1040672.76	1.04
21	3.53	3000000	3.76425E+11	4216229.93	1054057.48	1.05
22	2.85	3000000	2.45595E+11	2750837.69	687709.42	0.69
23	3.52	3000000	3.73766E+11	4186443.87	1046610.97	1.05
24	3.53	3000000	3.74828E+11	4198345.62	1049586.41	1.05
25	3.53	3000000	3.74828E+11	4198345.62	1049586.41	1.05
26	3.52	3000000	3.72705E+11	4174559.01	1043639.75	1.04
27	3.50	3000000	3.68475E+11	4127188.51	1031797.13	1.03
28	3.47	3000000	3.63746E+11	4074219.80	1018554.95	1.02
29	4.31	3000000	5.61229E+11	6286168.08	1571542.02	1.57
30	3.40	3000000	3.48203E+11	3900128.15	975032.04	0.98
31	3.3975	3000000	3.48203E+11	3900128.15	975032.04	0.98
Average=	3.37					0.97

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

month/year	Jun-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.43	3000000	3.5438E+11	3969308.67	992327.17	0.99
2	3.47	3000000	3.63746E+11	4074219.80	1018554.95	1.02
3	3.53	3000000	3.74828E+11	4198345.62	1049586.41	1.05
4	3.55	3000000	3.80699E+11	4264107.25	1066026.81	1.07
5	3.01	3000000	2.727E+11	3054432.36	763608.09	0.76
6	3.55	3000000	3.80164E+11	4258107.80	1064526.95	1.06
7	3.55	3000000	3.80699E+11	4264107.25	1066026.81	1.07
8	3.56	3000000	3.81236E+11	4270110.92	1067527.73	1.07
9	3.57	3000000	3.83921E+11	4300192.62	1075048.15	1.08
10	3.59	3000000	3.88779E+11	4354605.76	1088651.44	1.09
11	3.60	3000000	3.91491E+11	4384983.11	1096245.78	1.10
12	3.60	3000000	3.91491E+11	4384983.11	1096245.78	1.10
13	3.60	3000000	3.90948E+11	4378899.19	1094724.80	1.09
14	4.19	3000000	5.29593E+11	5931820.38	1482955.10	1.48
15	3.56	3000000	3.81772E+11	4276118.81	1069029.70	1.07
16	3.55	3000000	3.79629E+11	4252112.58	1063028.14	1.06
17	3.60	3000000	3.90948E+11	4378899.19	1094724.80	1.09
18	3.69	3000000	4.09628E+11	4588121.71	1147030.43	1.15
19	3.69	3000000	4.11297E+11	4606816.93	1151704.23	1.15
20	3.70	3000000	4.12411E+11	4619301.52	1154825.38	1.15
21	3.06	3000000	2.83076E+11	3170651.13	792662.78	0.79
22	3.69	3000000	4.09628E+11	4588121.71	1147030.43	1.15
23	3.69	3000000	4.11297E+11	4606816.93	1151704.23	1.15
24	3.69	3000000	4.1074E+11	4600580.97	1150145.24	1.15
25	3.68	3000000	4.07962E+11	4569464.51	1142366.13	1.14
26	3.67	3000000	4.05746E+11	4544647.37	1136161.84	1.14
27	4.48	3000000	6.0634E+11	6791442.14	1697860.54	1.70
28	3.59	3000000	3.89321E+11	4360672.79	1090168.20	1.09
29	3.57	3000000	3.84998E+11	4312254.87	1078063.72	1.08
30	3.59	3000000	3.88238E+11	4348542.96	1087135.74	1.09
Average=	3.61					1.11

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)
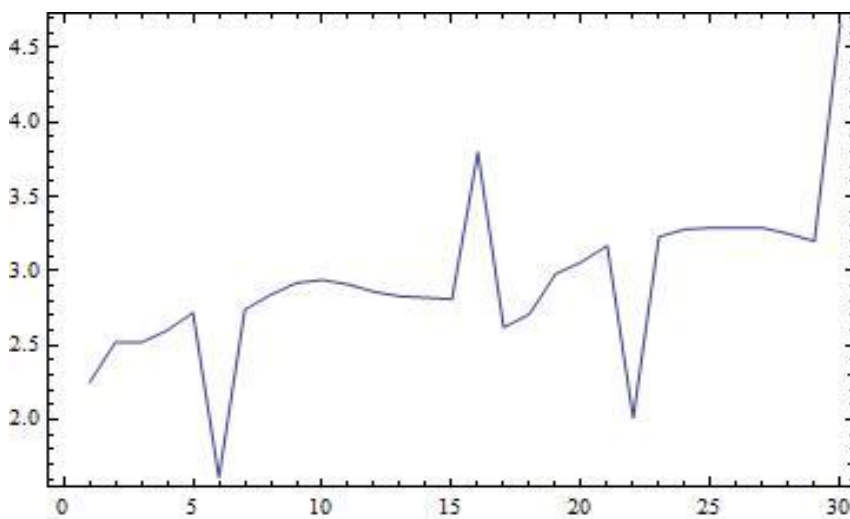
month/year	Jul-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.63	3000000	3.96944E+11	4446054.56	1111513.64	1.11
2	3.66	3000000	4.04641E+11	4532264.14	1133066.04	1.13
3	3.69	3000000	4.11297E+11	4606816.93	1151704.23	1.15
4	3.23	3000000	3.15366E+11	3532327.03	883081.76	0.88
5	3.68	3000000	4.09072E+11	4581898.42	1145474.61	1.15
6	3.71	3000000	4.14645E+11	4644321.39	1161080.35	1.16
7	3.73	3000000	4.20256E+11	4707166.70	1176791.67	1.18
8	3.76	3000000	4.27039E+11	4783138.57	1195784.64	1.20
9	3.79	3000000	4.33304E+11	4853313.73	1213328.43	1.21
10	3.80	3000000	4.3502E+11	4872541.10	1218135.27	1.22
11	3.79	3000000	4.32732E+11	4846913.05	1211728.26	1.21
12	3.78	3000000	4.3045E+11	4821352.58	1205338.14	1.21
13	4.47	3000000	6.0184E+11	6741042.00	1685260.50	1.69
14	3.75	3000000	4.23075E+11	4738747.74	1184686.93	1.18
15	3.71	3000000	4.14645E+11	4644321.39	1161080.35	1.16
16	3.67	3000000	4.05193E+11	4538453.64	1134613.41	1.13
17	3.71	3000000	4.15764E+11	4656856.66	1164214.17	1.16
18	3.74	3000000	4.20819E+11	4713474.46	1178368.62	1.18
19	3.74	3000000	4.21946E+11	4726102.65	1181525.66	1.18
20	3.16	3000000	3.01223E+11	3373914.80	843478.70	0.84
21	3.74	3000000	4.21383E+11	4719786.44	1179946.61	1.18
22	3.76	3000000	4.25338E+11	4764088.59	1191022.15	1.19
23	3.76	3000000	4.27039E+11	4783138.57	1195784.64	1.20
24	3.76	3000000	4.25904E+11	4770434.36	1192608.59	1.19
25	3.75	3000000	4.23075E+11	4738747.74	1184686.93	1.18
26	3.73	3000000	4.19693E+11	4700863.16	1175215.79	1.18
27	4.53	3000000	6.1994E+11	6943768.82	1735942.20	1.74
28	3.62	3000000	3.95304E+11	4427688.78	1106922.20	1.11
29	3.59	3000000	3.88238E+11	4348542.96	1087135.74	1.09
30	3.60	3000000	3.90405E+11	4372819.50	1093204.88	1.09
31	3.6475	3000000	4.01333E+11	4495215.82	1123803.95	1.12
Average=	3.73					1.18

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

Sandwip Channel

July 2009

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month/year	Aug-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.71	3000000	4.14086E+11	4638060.09	1159515.02	1.16
2	3.26	3000000	3.19934E+11	3583493.03	895873.26	0.90
3	3.69	3000000	4.10183E+11	4594349.23	1148587.31	1.15
4	3.73	3000000	4.18569E+11	4688268.76	1172067.19	1.17
5	3.77	3000000	4.27606E+11	4789497.02	1197374.25	1.20
6	3.80	3000000	4.3502E+11	4872541.10	1218135.27	1.22
7	3.82	3000000	4.40191E+11	4930451.28	1232612.82	1.23
8	3.82	3000000	4.40191E+11	4930451.28	1232612.82	1.23
9	3.81	3000000	4.3674E+11	4891806.48	1222951.62	1.22
10	3.81	3000000	4.3674E+11	4891806.48	1222951.62	1.22
11	3.81	3000000	4.37889E+11	4904671.19	1226167.80	1.23
12	4.53	3000000	6.19028E+11	6933561.15	1733390.29	1.73
13	3.72	3000000	4.16885E+11	4669408.83	1167352.21	1.17
14	3.64	3000000	3.98587E+11	4464458.36	1116114.59	1.12
15	3.62	3000000	3.9585E+11	4433806.48	1108451.62	1.11
16	3.65	3000000	4.01883E+11	4501379.98	1125344.99	1.13
17	3.70	3000000	4.11854E+11	4613057.11	1153264.28	1.15
18	3.07	3000000	2.83692E+11	3177555.11	794388.78	0.79
19	3.66	3000000	4.04641E+11	4532264.14	1133066.04	1.13
20	3.69	3000000	4.09628E+11	4588121.71	1147030.43	1.15
21	3.70	3000000	4.12969E+11	4625550.15	1156387.54	1.16
22	3.70	3000000	4.12969E+11	4625550.15	1156387.54	1.16
23	3.68	3000000	4.08517E+11	4575679.35	1143919.84	1.14
24	3.66	3000000	4.03536E+11	4519897.80	1129974.45	1.13
25	3.64	3000000	3.99135E+11	4470601.40	1117650.35	1.12
26	4.35	3000000	5.70811E+11	6393496.91	1598374.23	1.60
27	3.49	3000000	3.66896E+11	4109494.26	1027373.57	1.03
28	3.45	3000000	3.59048E+11	4021593.18	1005398.30	1.01
29	3.50	3000000	3.70059E+11	4144920.77	1036230.19	1.04
30	3.59	3000000	3.88238E+11	4348542.96	1087135.74	1.09
31	3.133333	3000000	2.96161E+11	3317211.36	829302.84	0.83
Average=	3.68					1.15
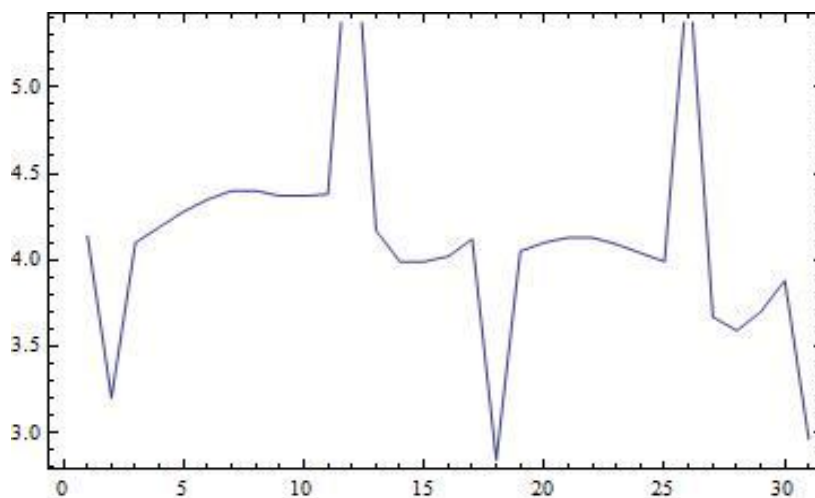
Sandwip Channel August 2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

month/year	Sep-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.55	3000000	3.80699E+11	4264107.25	1066026.81	1.07
2	3.60	3000000	3.90948E+11	4378899.19	1094724.80	1.09
3	3.65	3000000	4.00783E+11	4489055.88	1122263.97	1.12
4	3.68	3000000	4.07962E+11	4569464.51	1142366.13	1.14
5	3.69	3000000	4.11297E+11	4606816.93	1151704.23	1.15
6	3.69	3000000	4.10183E+11	4594349.23	1148587.31	1.15
7	3.68	3000000	4.09072E+11	4581898.42	1145474.61	1.15
8	3.69	3000000	4.10183E+11	4594349.23	1148587.31	1.15
9	3.70	3000000	4.11854E+11	4613057.11	1153264.28	1.15
10	3.68	3000000	4.08517E+11	4575679.35	1143919.84	1.14
11	4.31	3000000	5.61229E+11	6286168.08	1571542.02	1.57
12	3.48	3000000	3.64795E+11	4085961.06	1021490.26	1.02
13	3.46	3000000	3.61132E+11	4044940.55	1011235.14	1.01
14	3.50	3000000	3.68475E+11	4127188.51	1031797.13	1.03
15	3.56	3000000	3.82846E+11	4288147.27	1072036.82	1.07
16	2.83	3000000	2.42164E+11	2712409.69	678102.42	0.68
17	3.50	3000000	3.69003E+11	4133095.04	1033273.76	1.03
18	3.52	3000000	3.73766E+11	4186443.87	1046610.97	1.05
19	3.54	3000000	3.78025E+11	4234152.25	1058538.06	1.06
20	3.54	3000000	3.77491E+11	4228173.92	1057043.48	1.06
21	3.51	3000000	3.71116E+11	4156763.40	1039190.85	1.04
22	3.48	3000000	3.6427E+11	4080088.32	1020022.08	1.02
23	3.45	3000000	3.59568E+11	4027423.69	1006855.92	1.01
24	3.44	3000000	3.56451E+11	3992504.00	998126.00	1.00
25	4.01	3000000	4.85875E+11	5442148.78	1360537.19	1.36
26	3.28	3000000	3.24041E+11	3629487.85	907371.96	0.91
27	3.31	3000000	3.30998E+11	3707419.41	926854.85	0.93
28	3.40	3000000	3.47691E+11	3894390.55	973597.64	0.97
29	3.45	3000000	3.59568E+11	4027423.69	1006855.92	1.01
30	2.86	3000000	2.46169E+11	2757268.63	689317.16	0.69
Average=	3.53					1.06

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

Sandwip Channel September 2009

month/year	Oct-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.41	3000000	3.49742E+11	3917366.26	979341.56	0.98
2	3.45	3000000	3.58528E+11	4015766.90	1003941.72	1.00
3	3.48	3000000	3.6427E+11	4080088.32	1020022.08	1.02
4	3.49	3000000	3.67422E+11	4115388.12	1028847.03	1.03
5	3.49	3000000	3.6637E+11	4103604.63	1025901.16	1.03
6	3.49	3000000	3.6637E+11	4103604.63	1025901.16	1.03
7	3.49	3000000	3.67948E+11	4121286.21	1030321.55	1.03
8	3.49	3000000	3.67948E+11	4121286.21	1030321.55	1.03
9	3.48	3000000	3.6427E+11	4080088.32	1020022.08	1.02
10	4.13	3000000	5.15365E+11	5772458.33	1443114.58	1.44
11	3.29	3000000	3.26517E+11	3657225.52	914306.38	0.91
12	3.28	3000000	3.24041E+11	3629487.85	907371.96	0.91
13	3.31	3000000	3.29501E+11	3690650.11	922662.53	0.92
14	3.37	3000000	3.43098E+11	3842942.29	960735.57	0.96
15	2.64	3000000	2.10243E+11	2354874.68	588718.67	0.59
16	3.32	3000000	3.31998E+11	3718620.07	929655.02	0.93
17	3.34	3000000	3.36517E+11	3769232.09	942308.02	0.94
18	3.35	3000000	3.38535E+11	3791836.13	947959.03	0.95
19	3.34	3000000	3.36013E+11	3763591.64	940897.91	0.94
20	3.30	3000000	3.28505E+11	3679491.68	919872.92	0.92
21	3.27	3000000	3.22066E+11	3607373.73	901843.43	0.90
22	3.25	3000000	3.19116E+11	3574329.26	893582.32	0.89
23	3.25	3000000	3.18136E+11	3563348.22	890837.06	0.89
24	3.24	3000000	3.16179E+11	3541436.83	885359.21	0.89
25	3.72	3000000	4.18194E+11	4684074.38	1171018.59	1.17
26	3.13	3000000	2.96003E+11	3315447.12	828861.78	0.83
27	3.21	3000000	3.11315E+11	3486954.00	871738.50	0.87
28	3.26	3000000	3.2059E+11	3590832.49	897708.12	0.90
29	3.28	3000000	3.2503E+11	3640570.25	910142.56	0.91
30	3.31	3000000	3.29501E+11	3690650.11	922662.53	0.92
31	2.61	3000000	2.05492E+11	2301658.89	575414.72	0.58
Average=	3.34					0.95

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

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month/year	Nov-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.28	3000000	3.24535E+11	3635026.94	908756.73	0.91
2	3.29	3000000	3.26021E+11	3651669.54	912917.38	0.91
3	3.29	3000000	3.25525E+11	3646117.78	911529.45	0.91
4	3.29	3000000	3.26517E+11	3657225.52	914306.38	0.91
5	3.30	3000000	3.2751E+11	3668350.16	917087.54	0.92
6	3.29	3000000	3.27014E+11	3662785.73	915696.43	0.92
7	3.28	3000000	3.23547E+11	3623952.98	905988.25	0.91
8	3.98	3000000	4.77838E+11	5352123.05	1338030.76	1.34
9	3.13	3000000	2.96003E+11	3315447.12	828861.78	0.83
10	3.11	3000000	2.90829E+11	3257490.48	814372.62	0.81
11	3.12	3000000	2.94116E+11	3294312.85	823578.21	0.82
12	3.18	3000000	3.0409E+11	3406021.66	851505.41	0.85
13	3.21	3000000	3.11315E+11	3486954.00	871738.50	0.87
14	2.46	3000000	1.82057E+11	2039165.21	509791.30	0.51
15	3.17	3000000	3.02177E+11	3384600.19	846150.05	0.85
16	3.16	3000000	3.00747E+11	3368578.44	842144.61	0.84
17	3.14	3000000	2.97896E+11	3336648.96	834162.24	0.83
18	3.12	3000000	2.94116E+11	3294312.85	823578.21	0.82
19	3.11	3000000	2.91297E+11	3262738.15	815684.54	0.82
20	3.11	3000000	2.92235E+11	3273246.15	818311.54	0.82
21	3.11	3000000	2.91766E+11	3267990.04	816997.51	0.82
22	3.10	3000000	2.90361E+11	3252247.03	813061.76	0.81
23	3.68	3000000	4.07777E+11	4567393.83	1141848.46	1.14
24	3.01	3000000	2.73305E+11	3061208.69	765302.17	0.77
25	3.01	3000000	2.73759E+11	3066295.86	766573.97	0.77
26	3.08	3000000	2.857E+11	3200044.88	800011.22	0.80
27	3.15	3000000	2.9837E+11	3341959.98	835490.00	0.84
28	3.16	3000000	3.00271E+11	3363246.30	840811.57	0.84
29	3.16	3000000	3.00271E+11	3363246.30	840811.57	0.84
30	2.43	3000000	1.78126E+11	1995135.95	498783.99	0.50
Average=	3.16					0.85

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

Sandwip Channel November 2009

month/year	Dec-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.11	3000000	2.90829E+11	3257490.48	814372.62	0.81
2	3.12	3000000	2.93175E+11	3283771.05	820942.76	0.82
3	3.13	3000000	2.95059E+11	3304871.54	826217.88	0.83
4	3.14	3000000	2.96949E+11	3326039.59	831509.90	0.83
5	3.13	3000000	2.96003E+11	3315447.12	828861.78	0.83
6	3.12	3000000	2.92705E+11	3278506.49	819626.62	0.82
7	3.89	3000000	4.56471E+11	5112804.05	1278201.01	1.28
8	3.00	3000000	2.71492E+11	3040902.22	760225.55	0.76
9	2.95	3000000	2.62073E+11	2935401.92	733850.48	0.73
10	2.95	3000000	2.62963E+11	2945369.32	736342.33	0.74
11	3.00	3000000	2.70588E+11	3030774.32	757693.58	0.76
12	3.03	3000000	2.76949E+11	3102024.35	775506.09	0.78
13	3.04	3000000	2.7878E+11	3122533.55	780633.39	0.78
14	2.37	3000000	1.68962E+11	1892492.36	473123.09	0.47
15	2.99	3000000	2.69234E+11	3015614.16	753903.54	0.75
16	2.99	3000000	2.69234E+11	3015614.16	753903.54	0.75
17	2.99	3000000	2.70136E+11	3025716.71	756429.18	0.76
18	3.01	3000000	2.72851E+11	3056125.73	764031.43	0.76
19	3.03	3000000	2.76035E+11	3091795.10	772948.77	0.77
20	3.04	3000000	2.77864E+11	3112270.50	778067.63	0.78
21	3.02	3000000	2.75124E+11	3081582.73	770395.68	0.77
22	3.00	3000000	2.71039E+11	3035836.16	758959.04	0.76
23	3.58	3000000	3.87337E+11	4338447.69	1084611.92	1.08
24	2.91	3000000	2.55008E+11	2856270.88	714067.72	0.71
25	2.89	3000000	2.51512E+11	2817110.82	704277.71	0.70
26	2.91	3000000	2.55447E+11	2861184.90	715296.22	0.72
27	2.99	3000000	2.69685E+11	3020663.32	755165.83	0.76
28	2.99	3000000	2.70136E+11	3025716.71	756429.18	0.76
29	2.99	3000000	2.70136E+11	3025716.71	756429.18	0.76
30	2.24	3000000	1.5091E+11	1690294.88	422573.72	0.42
31	2.9875	3000000	2.69234E+11	3015614.16	753903.54	0.75
Average=	3.02					0.77
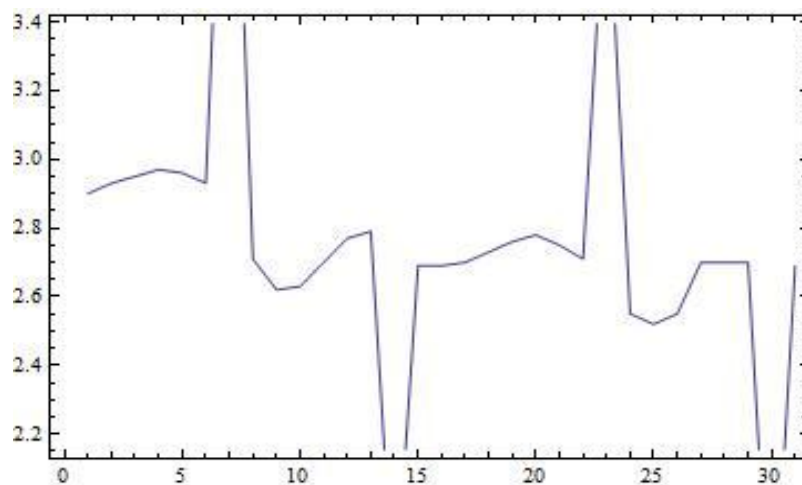
Sandwip Channel December 2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

AII: Calculation for Sandwip Channel during Year 2005

month/year	Jan-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.99	3000000	2.70136E+11	3025716.71	756429.18	0.76
2	3.60	3000000	3.90224E+11	4370793.88	1092698.47	1.09
3	2.93	3000000	2.58528E+11	2895701.25	723925.31	0.72
4	2.89	3000000	2.52383E+11	2826875.50	706718.87	0.71
5	2.91	3000000	2.55008E+11	2856270.88	714067.72	0.71
6	2.99	3000000	2.69685E+11	3020663.32	755165.83	0.76
7	3.00	3000000	2.70588E+11	3030774.32	757693.58	0.76
8	2.22	3000000	1.48669E+11	1665198.05	416299.51	0.42
9	2.95	3000000	2.61628E+11	2930424.55	732606.14	0.73
10	2.95	3000000	2.62963E+11	2945369.32	736342.33	0.74
11	2.95	3000000	2.62517E+11	2940383.51	735095.88	0.74
12	2.95	3000000	2.62517E+11	2940383.51	735095.88	0.74
13	3.80	3000000	4.36358E+11	4887522.00	1221880.50	1.22
14	2.94	3000000	2.60297E+11	2915517.79	728879.45	0.73
15	3.70	3000000	4.12969E+11	4625550.15	1156387.54	1.16
16	2.85	3000000	2.45451E+11	2749231.13	687307.78	0.69
17	2.82	3000000	2.39465E+11	2682179.23	670544.81	0.67
18	2.80	3000000	2.35656E+11	2639511.57	659877.89	0.66
19	2.81	3000000	2.37345E+11	2658432.74	664608.19	0.66
20	2.84	3000000	2.42449E+11	2715601.70	678900.43	0.68
21	2.88	3000000	2.50641E+11	2807363.04	701840.76	0.70
22	2.33	3000000	1.63767E+11	1834306.01	458576.50	0.46
23	2.85	3000000	2.45021E+11	2744414.25	686103.56	0.69
24	2.88	3000000	2.49773E+11	2797632.15	699408.04	0.70
25	2.17	3000000	1.4172E+11	1587369.96	396842.49	0.40
26	2.96	3000000	2.63408E+11	2950359.35	737589.84	0.74
27	2.98	3000000	2.67435E+11	2995459.74	748864.93	0.75
28	2.98	3000000	2.66986E+11	2990431.69	747607.92	0.75
29	2.97	3000000	2.66089E+11	2980388.26	745097.07	0.75
30	2.97	3000000	2.65641E+11	2975372.89	743843.22	0.74
31	3.67	3000000	4.06299E+11	4550845.32	1137711.33	1.14
Average=	2.95					0.75

Sandwip Channel January 2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)
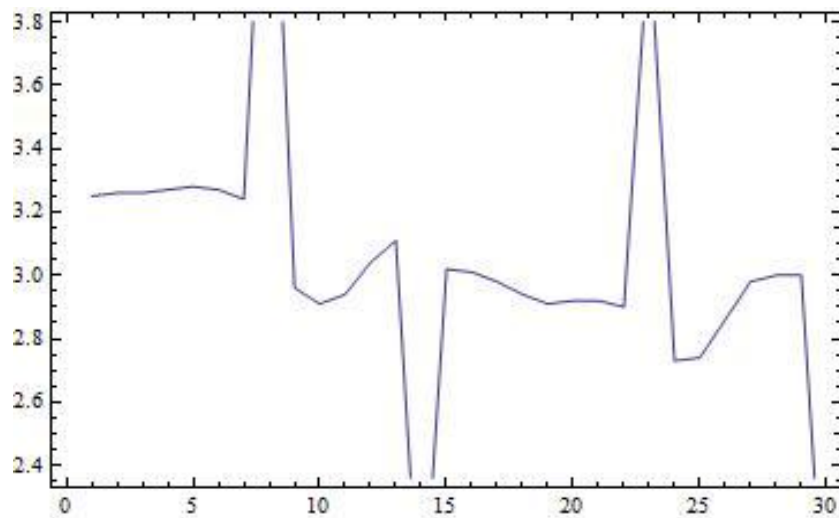
month/year	Feb-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.91	3000000	2.55886E+11	2866103.13	716525.78	0.72
2	2.85	3000000	2.44592E+11	2739601.60	684900.40	0.68
3	2.90	3000000	2.53257E+11	2836657.06	709164.27	0.71
4	2.84	3000000	2.43733E+11	2729988.97	682497.24	0.68
5	2.86	3000000	2.45882E+11	2754052.22	688513.06	0.69
6	2.88	3000000	2.50207E+11	2802495.48	700623.87	0.70
7	2.09	3000000	1.32188E+11	1480596.52	370149.13	0.37
8	2.86	3000000	2.47175E+11	2768540.85	692135.21	0.69
9	2.89	3000000	2.51076E+11	2812234.82	703058.70	0.70
10	2.91	3000000	2.5457E+11	2851361.09	712840.27	0.71
11	2.92	3000000	2.56325E+11	2871025.59	717756.40	0.72
12	2.91	3000000	2.55447E+11	2861184.90	715296.22	0.72
13	2.90	3000000	2.53257E+11	2836657.06	709164.27	0.71
14	3.61	3000000	3.93123E+11	4403260.20	1100815.05	1.10
15	2.78	3000000	2.33133E+11	2611256.52	652814.13	0.65
16	2.73	3000000	2.24822E+11	2518171.13	629542.78	0.63
17	2.69	3000000	2.18688E+11	2449465.74	612366.44	0.61
18	2.73	3000000	2.25234E+11	2522785.27	630696.32	0.63
19	2.84	3000000	2.42449E+11	2715601.70	678900.43	0.68
20	2.32	3000000	1.62364E+11	1818594.68	454648.67	0.45
21	2.81	3000000	2.37768E+11	2663173.59	665793.40	0.67
22	2.87	3000000	2.4804E+11	2778221.06	694555.26	0.69
23	2.92	3000000	2.57646E+11	2885818.32	721454.58	0.72
24	2.72	3000000	2.23589E+11	2504354.03	626088.51	0.63
25	2.99	3000000	2.69685E+11	3020663.32	755165.83	0.76
26	2.99	3000000	2.69685E+11	3020663.32	755165.83	0.76
27	2.99	3000000	2.70136E+11	3025716.71	756429.18	0.76
28	3.00	3000000	2.71944E+11	3045972.50	761493.12	0.76
Average=	3.0025					0.69

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

Sandwip Channel February 2005

month/year	Mar-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.00	3000000	2.71492E+11	3040902.22	760225.55	0.76
2	3.70	3000000	4.12969E+11	4625550.15	1156387.54	1.16
3	2.85	3000000	2.45021E+11	2744414.25	686103.56	0.69
4	2.77	3000000	2.30624E+11	2583153.52	645788.38	0.65
5	2.80	3000000	2.36922E+11	2653696.11	663424.03	0.66
6	2.83	3000000	2.41594E+11	2706031.31	676507.83	0.68
7	2.16	3000000	1.40741E+11	1576403.71	394100.93	0.39
8	2.84	3000000	2.43305E+11	2725188.99	681297.25	0.68
9	2.88	3000000	2.49773E+11	2797632.15	699408.04	0.70
10	2.93	3000000	2.58087E+11	2890757.67	722689.42	0.72
11	2.96	3000000	2.63408E+11	2950359.35	737589.84	0.74
12	2.99	3000000	2.69234E+11	3015614.16	753903.54	0.75
13	2.95	3000000	2.62517E+11	2940383.51	735095.88	0.74
14	2.93	3000000	2.59412E+11	2905601.07	726400.27	0.73
15	2.92	3000000	2.56325E+11	2871025.59	717756.40	0.72
16	3.55	3000000	3.7945E+11	4250115.11	1062528.78	1.06
17	2.77	3000000	2.31877E+11	2597186.01	649296.50	0.65
18	2.73	3000000	2.24411E+11	2513561.20	628390.30	0.63
19	2.76	3000000	2.29791E+11	2573819.64	643454.91	0.64
20	2.89	3000000	2.51076E+11	2812234.82	703058.70	0.70
21	2.41	3000000	1.74721E+11	1957004.53	489251.13	0.49
22	2.88	3000000	2.50207E+11	2802495.48	700623.87	0.70
23	2.95	3000000	2.62963E+11	2945369.32	736342.33	0.74
24	3.02	3000000	2.75124E+11	3081582.73	770395.68	0.77
25	3.07	3000000	2.84309E+11	3184466.59	796116.65	0.80
26	3.09	3000000	2.88492E+11	3231315.49	807828.87	0.81
27	3.09	3000000	2.88492E+11	3231315.49	807828.87	0.81
28	3.10	3000000	2.89425E+11	3241772.81	810443.20	0.81
29	3.11	3000000	2.92235E+11	3273246.15	818311.54	0.82
30	3.11	3000000	2.90829E+11	3257490.48	814372.62	0.81
31	3.82	3000000	4.40191E+11	4930451.28	1232612.82	1.23
Average=	2.96					0.75

Sandwip Channel March 2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

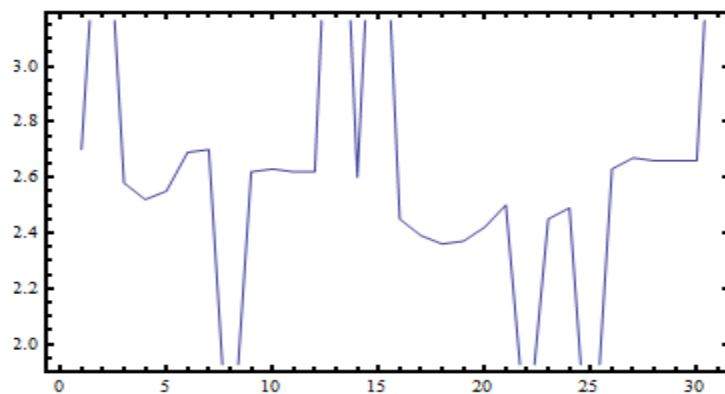| month/year	Apr-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.93	3000000	2.58528E+11	2895701.25	723925.31	0.72
2	2.87	3000000	2.48472E+11	2783067.50	695766.87	0.70
3	2.93	3000000	2.58087E+11	2890757.67	722689.42	0.72
4	2.97	3000000	2.65641E+11	2975372.89	743843.22	0.74
5	3.05	3000000	2.80157E+11	3137959.79	784489.95	0.78
6	2.22	3000000	1.49116E+11	1670202.40	417550.60	0.42
7	3.03	3000000	2.77406E+11	3107145.32	776786.33	0.78
8	3.09	3000000	2.8756E+11	3220875.06	805218.76	0.81
9	3.12	3000000	2.92705E+11	3278506.49	819626.62	0.82
10	3.11	3000000	2.91297E+11	3262738.15	815684.54	0.82
11	3.09	3000000	2.87094E+11	3215661.18	803915.29	0.80
12	3.06	3000000	2.82922E+11	3168926.31	792231.58	0.79
13	3.05	3000000	2.80617E+11	3143110.32	785777.58	0.79
14	3.05	3000000	2.79698E+11	3132813.49	783203.37	0.78
15	3.56	3000000	3.81593E+11	4274115.71	1068528.93	1.07
16	2.92	3000000	2.56765E+11	2875952.28	718988.07	0.72
17	2.96	3000000	2.63408E+11	2950359.35	737589.84	0.74
18	3.10	3000000	2.88958E+11	3236542.04	809135.51	0.81
19	3.15	3000000	2.9932E+11	3352594.70	838148.67	0.84
20	3.20	3000000	3.08897E+11	3459870.97	864967.74	0.86
21	2.53	3000000	1.93597E+11	2168426.08	542106.52	0.54
22	3.23	3000000	3.15204E+11	3530506.48	882626.62	0.88
23	3.27	3000000	3.23053E+11	3618422.34	904605.59	0.90
24	3.29	3000000	3.26517E+11	3657225.52	914306.38	0.91
25	3.29	3000000	3.27014E+11	3662785.73	915696.43	0.92
26	3.30	3000000	3.28007E+11	3673918.81	918479.70	0.92
27	3.30	3000000	3.28007E+11	3673918.81	918479.70	0.92
28	3.29	3000000	3.25525E+11	3646117.78	911529.45	0.91
29	3.25	3000000	3.18136E+11	3563348.22	890837.06	0.89
30	3.84	3000000	4.45585E+11	4990867.63	1247716.91	1.25
Average=	3.10					0.82

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

Sandwip Channel April 2005

month/year	May-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.12	3000000	2.93175E+11	3283771.05	820942.76	0.82
2	3.16	3000000	3.01223E+11	3373914.80	843478.70	0.84
3	3.21	3000000	3.09863E+11	3470691.51	867672.88	0.87
4	3.28	3000000	3.24535E+11	3635026.94	908756.73	0.91
5	2.56	3000000	1.98209E+11	2220087.63	555021.91	0.56
6	3.30	3000000	3.28505E+11	3679491.68	919872.92	0.92
7	3.33	3000000	3.35007E+11	3752323.40	938080.85	0.94
8	3.35	3000000	3.37525E+11	3780525.66	945131.41	0.95
9	3.33	3000000	3.34003E+11	3741072.07	935268.02	0.94
10	3.30	3000000	3.29003E+11	3685068.78	921267.20	0.92
11	3.30	3000000	3.2751E+11	3668350.16	917087.54	0.92
12	3.29	3000000	3.27014E+11	3662785.73	915696.43	0.92
13	3.30	3000000	3.28007E+11	3673918.81	918479.70	0.92
14	3.84	3000000	4.4404E+11	4973568.27	1243392.07	1.24
15	3.23	3000000	3.14716E+11	3525047.64	881261.91	0.88
16	3.25	3000000	3.18136E+11	3563348.22	890837.06	0.89
17	3.36	3000000	3.40559E+11	3814507.74	953626.94	0.95
18	3.45	3000000	3.59048E+11	4021593.18	1005398.30	1.01
19	3.48	3000000	3.65844E+11	4097719.21	1024429.80	1.02
20	3.52	3000000	3.73766E+11	4186443.87	1046610.97	1.05
21	2.85	3000000	2.45021E+11	2744414.25	686103.56	0.69
22	3.52	3000000	3.72705E+11	4174559.01	1043639.75	1.04
23	3.53	3000000	3.74828E+11	4198345.62	1049586.41	1.05
24	3.53	3000000	3.7536E+11	4204302.84	1051075.71	1.05
25	3.53	3000000	3.7536E+11	4204302.84	1051075.71	1.05
26	3.52	3000000	3.74297E+11	4192392.64	1048098.16	1.05
27	3.51	3000000	3.70587E+11	4150839.97	1037709.99	1.04
28	4.23	3000000	5.40604E+11	6055149.61	1513787.40	1.51
29	3.42	3000000	3.518E+11	3940409.54	985102.39	0.99
30	3.40	3000000	3.48716E+11	3905869.96	976467.49	0.98
31	3.42	3000000	3.52831E+11	3951956.52	987989.13	0.99
Average=	3.37					0.96
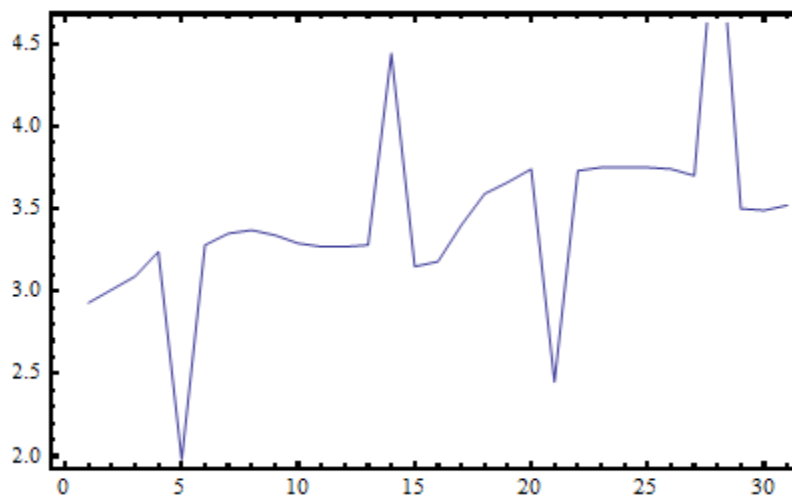
Sandwip Channel May 2005
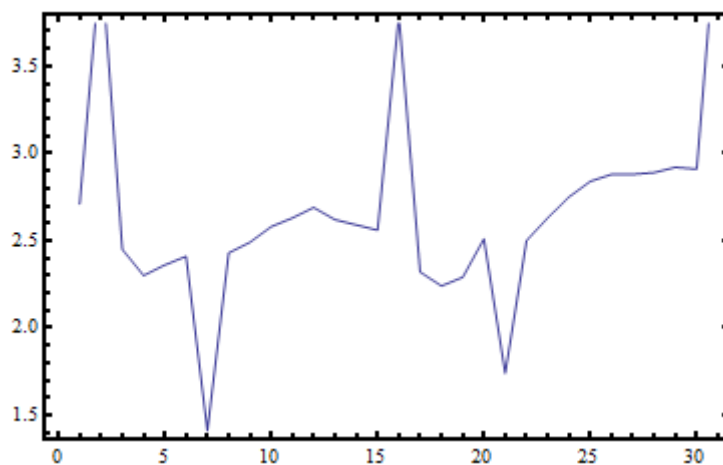
Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

month/year	Jun-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.47	3000000	3.627E+11	4062495.43	1015623.86	1.02
2	3.53	3000000	3.7536E+11	4204302.84	1051075.71	1.05
3	3.56	3000000	3.81772E+11	4276118.81	1069029.70	1.07
4	2.96	3000000	2.63705E+11	2953688.39	738422.10	0.74
5	3.56	3000000	3.82309E+11	4282130.93	1070532.73	1.07
6	3.56	3000000	3.82309E+11	4282130.93	1070532.73	1.07
7	3.55	3000000	3.80164E+11	4258107.80	1064526.95	1.06
8	3.55	3000000	3.80164E+11	4258107.80	1064526.95	1.06
9	3.56	3000000	3.82309E+11	4282130.93	1070532.73	1.07
10	3.58	3000000	3.86077E+11	4324334.00	1081083.50	1.08
11	3.58	3000000	3.87156E+11	4336430.04	1084107.51	1.08
12	3.58	3000000	3.86077E+11	4324334.00	1081083.50	1.08
13	4.11	3000000	5.1039E+11	5716730.98	1429182.75	1.43
14	3.53	3000000	3.76425E+11	4216229.93	1054057.48	1.05
15	3.55	3000000	3.79094E+11	4246121.58	1061530.39	1.06
16	3.63	3000000	3.96397E+11	4439928.41	1109982.10	1.11
17	3.70	3000000	4.12969E+11	4625550.15	1156387.54	1.16
18	3.71	3000000	4.14086E+11	4638060.09	1159515.02	1.16
19	3.71	3000000	4.14645E+11	4644321.39	1161080.35	1.16
20	3.09	3000000	2.87405E+11	3219136.63	804784.16	0.80
21	3.69	3000000	4.11297E+11	4606816.93	1151704.23	1.15
22	3.71	3000000	4.14086E+11	4638060.09	1159515.02	1.16
23	3.71	3000000	4.15764E+11	4656856.66	1164214.17	1.16
24	3.71	3000000	4.14645E+11	4644321.39	1161080.35	1.16
25	3.69	3000000	4.11297E+11	4606816.93	1151704.23	1.15
26	3.67	3000000	4.06299E+11	4550845.32	1137711.33	1.14
27	4.42	3000000	5.8933E+11	6600920.23	1650230.06	1.65
28	3.59	3000000	3.87697E+11	4342484.39	1085621.10	1.09
29	3.59	3000000	3.89321E+11	4360672.79	1090168.20	1.09
30	3.63	3000000	3.98039E+11	4458319.53	1114579.88	1.11
Average=	3.62					1.11
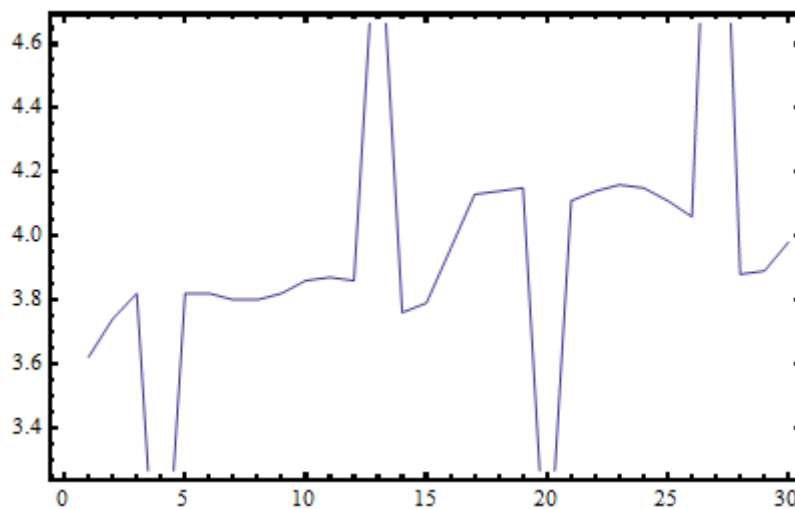
Sandwip Channel Jun 2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

month/year	Jul-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.67	3000000	4.06853E+11	4557047.49	1139261.87	1.14
2	3.70	3000000	4.11854E+11	4613057.11	1153264.28	1.15
3	3.22	3000000	3.12771E+11	3503254.51	875813.63	0.88
4	3.69	3000000	4.09628E+11	4588121.71	1147030.43	1.15
5	3.70	3000000	4.11854E+11	4613057.11	1153264.28	1.15
6	3.71	3000000	4.15204E+11	4650586.91	1162646.73	1.16
7	3.73	3000000	4.20256E+11	4707166.70	1176791.67	1.18
8	3.76	3000000	4.26471E+11	4776784.35	1194196.09	1.19
9	3.78	3000000	4.3102E+11	4827736.36	1206934.09	1.21
10	3.78	3000000	4.3102E+11	4827736.36	1206934.09	1.21
11	3.77	3000000	4.27606E+11	4789497.02	1197374.25	1.20
12	4.39	3000000	5.81357E+11	6511619.07	1627904.77	1.63
13	3.72	3000000	4.16885E+11	4669408.83	1167352.21	1.17
14	3.69	3000000	4.1074E+11	4600580.97	1150145.24	1.15
15	3.67	3000000	4.05193E+11	4538453.64	1134613.41	1.13
16	3.72	3000000	4.16885E+11	4669408.83	1167352.21	1.17
17	3.75	3000000	4.24772E+11	4757747.04	1189436.76	1.19
18	3.74	3000000	4.21946E+11	4726102.65	1181525.66	1.18
19	3.21	3000000	3.10831E+11	3481528.95	870382.24	0.87
20	3.74	3000000	4.20819E+11	4713474.46	1178368.62	1.18
21	3.77	3000000	4.28174E+11	4795859.68	1198964.92	1.20
22	3.78	3000000	4.3102E+11	4827736.36	1206934.09	1.21
23	3.78	3000000	4.3102E+11	4827736.36	1206934.09	1.21
24	3.77	3000000	4.27606E+11	4789497.02	1197374.25	1.20
25	3.75	3000000	4.24206E+11	4751409.72	1187852.43	1.19
26	4.56	3000000	6.26338E+11	7015432.75	1753858.19	1.75
27	3.64	3000000	4.00233E+11	4482900.16	1120725.04	1.12
28	3.61	3000000	3.92035E+11	4391071.25	1097767.81	1.10
29	3.62	3000000	3.94213E+11	4415466.04	1103866.51	1.10
30	3.66	3000000	4.04088E+11	4526078.86	1131519.72	1.13
31	3.695	3000000	4.11854E+11	4613057.11	1153264.28	1.15
Average=	3.73					1.18

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

Sandwip Channel July 2005

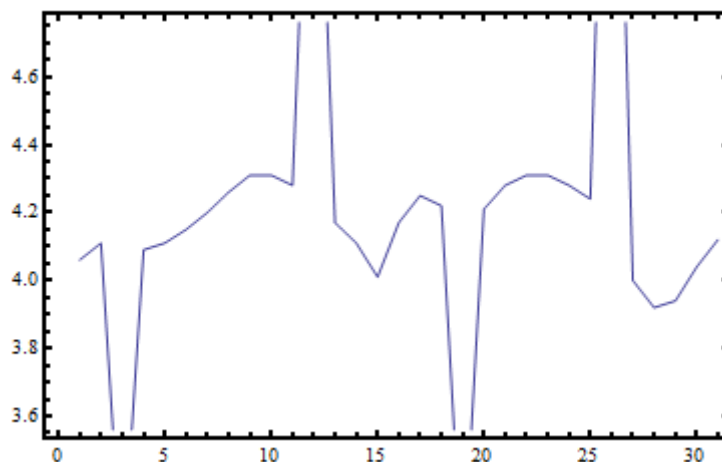| month/year	Aug-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.28	3000000	3.23876E+11	3627642.42	906910.61	0.91
2	3.68	3000000	4.07962E+11	4569464.51	1142366.13	1.14
3	3.71	3000000	4.15204E+11	4650586.91	1162646.73	1.16
4	3.75	3000000	4.24206E+11	4751409.72	1187852.43	1.19
5	3.79	3000000	4.32161E+11	4840516.60	1210129.15	1.21
6	3.81	3000000	4.38464E+11	4911109.88	1227777.47	1.23
7	3.82	3000000	4.40191E+11	4930451.28	1232612.82	1.23
8	3.81	3000000	4.3674E+11	4891806.48	1222951.62	1.22
9	3.79	3000000	4.33304E+11	4853313.73	1213328.43	1.21
10	3.78	3000000	4.3102E+11	4827736.36	1206934.09	1.21
11	4.47	3000000	6.0184E+11	6741042.00	1685260.50	1.69
12	3.72	3000000	4.18007E+11	4681977.89	1170494.47	1.17
13	3.66	3000000	4.04088E+11	4526078.86	1131519.72	1.13
14	3.62	3000000	3.94758E+11	4421575.30	1105393.82	1.11
15	3.65	3000000	4.02434E+11	4507548.36	1126887.09	1.13
16	3.66	3000000	4.04641E+11	4532264.14	1133066.04	1.13
17	3.15	3000000	2.9932E+11	3352594.70	838148.67	0.84
18	3.67	3000000	4.05193E+11	4538453.64	1134613.41	1.13
19	3.70	3000000	4.12411E+11	4619301.52	1154825.38	1.15
20	3.71	3000000	4.15764E+11	4656856.66	1164214.17	1.16
21	3.71	3000000	4.15764E+11	4656856.66	1164214.17	1.16
22	3.70	3000000	4.13527E+11	4631803.01	1157950.75	1.16
23	3.68	3000000	4.07962E+11	4569464.51	1142366.13	1.14
24	3.66	3000000	4.02985E+11	4513720.97	1128430.24	1.13
25	4.40	3000000	5.84009E+11	6541318.55	1635329.64	1.64
26	3.51	3000000	3.70587E+11	4150839.97	1037709.99	1.04
27	3.46	3000000	3.60089E+11	4033258.42	1008314.61	1.01
28	3.49	3000000	3.67422E+11	4115388.12	1028847.03	1.03
29	3.57	3000000	3.84459E+11	4306221.63	1076555.41	1.08
30	3.16	3000000	3.01223E+11	3373914.80	843478.70	0.84
31	3.5375	3000000	3.77491E+11	4228173.92	1057043.48	1.06
Average=	3.68					1.15

Sandwip Channel

August

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

month/year	Sep-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.59	3000000	3.87697E+11	4342484.39	1085621.10	1.09
2	3.64	3000000	3.98587E+11	4464458.36	1116114.59	1.12
3	3.67	3000000	4.06853E+11	4557047.49	1139261.87	1.14
4	3.70	3000000	4.11854E+11	4613057.11	1153264.28	1.15
5	3.70	3000000	4.11854E+11	4613057.11	1153264.28	1.15
6	3.68	3000000	4.07962E+11	4569464.51	1142366.13	1.14
7	3.67	3000000	4.05746E+11	4544647.37	1136161.84	1.14
8	3.68	3000000	4.07407E+11	4563253.89	1140813.47	1.14
9	3.68	3000000	4.07407E+11	4563253.89	1140813.47	1.14
10	4.33	3000000	5.66446E+11	6344598.45	1586149.61	1.59
11	3.52	3000000	3.73235E+11	4180499.33	1045124.83	1.05
12	3.45	3000000	3.59048E+11	4021593.18	1005398.30	1.01
13	3.48	3000000	3.64795E+11	4085961.06	1021490.26	1.02
14	3.53	3000000	3.76425E+11	4216229.93	1054057.48	1.05
15	2.94	3000000	2.61332E+11	2927108.65	731777.16	0.73
16	3.50	3000000	3.6953E+11	4139005.80	1034751.45	1.03
17	3.53	3000000	3.7536E+11	4204302.84	1051075.71	1.05
18	3.55	3000000	3.79629E+11	4252112.58	1063028.14	1.06
19	3.55	3000000	3.80699E+11	4264107.25	1066026.81	1.07
20	3.53	3000000	3.76425E+11	4216229.93	1054057.48	1.05
21	3.50	3000000	3.68475E+11	4127188.51	1031797.13	1.03
22	3.47	3000000	3.627E+11	4062495.43	1015623.86	1.02
23	3.45	3000000	3.58008E+11	4009944.84	1002486.21	1.00
24	4.06	3000000	4.98057E+11	5578595.19	1394648.80	1.39
25	3.28	3000000	3.24535E+11	3635026.94	908756.73	0.91
26	3.28	3000000	3.23547E+11	3623952.98	905988.25	0.91
27	3.37	3000000	3.42589E+11	3837246.93	959311.73	0.96
28	3.44	3000000	3.57488E+11	4004127.00	1001031.75	1.00
29	2.86	3000000	2.47319E+11	2770153.05	692538.26	0.69
30	3.39	3000000	3.47179E+11	3888657.19	972164.30	0.97
Average=	3.53					1.06

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

Sandwip Channel September 2005

month/year	Oct-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.44	3000000	3.56451E+11	3992504.00	998126.00	1.00
2	3.47	3000000	3.63223E+11	4068355.50	1017088.88	1.02
3	3.49	3000000	3.67422E+11	4115388.12	1028847.03	1.03
4	3.49	3000000	3.6637E+11	4103604.63	1025901.16	1.03
5	3.47	3000000	3.63746E+11	4074219.80	1018554.95	1.02
6	3.47	3000000	3.63746E+11	4074219.80	1018554.95	1.02
7	3.49	3000000	3.66896E+11	4109494.26	1027373.57	1.03
8	3.48	3000000	3.65844E+11	4097719.21	1024429.80	1.02
9	3.45	3000000	3.59568E+11	4027423.69	1006855.92	1.01
10	3.98	3000000	4.78638E+11	5361091.84	1340272.96	1.34
11	3.27	3000000	3.22066E+11	3607373.73	901843.43	0.90
12	3.29	3000000	3.27014E+11	3662785.73	915696.43	0.92
13	3.36	3000000	3.41066E+11	3820186.20	955046.55	0.96
14	3.42	3000000	3.52831E+11	3951956.52	987989.13	0.99
15	2.58	3000000	2.00795E+11	2249051.28	562262.82	0.56
16	3.35	3000000	3.37525E+11	3780525.66	945131.41	0.95
17	3.36	3000000	3.40559E+11	3814507.74	953626.94	0.95
18	3.36	3000000	3.40053E+11	3808833.50	952208.38	0.95
19	3.33	3000000	3.34003E+11	3741072.07	935268.02	0.94
20	3.29	3000000	3.25525E+11	3646117.78	911529.45	0.91
21	3.26	3000000	3.20098E+11	3585327.19	896331.80	0.90
22	3.25	3000000	3.17646E+11	3557864.04	889466.01	0.89
23	3.24	3000000	3.16668E+11	3546908.35	886727.09	0.89
24	3.73	3000000	4.18943E+11	4692465.02	1173116.25	1.17
25	3.12	3000000	2.92705E+11	3278506.49	819626.62	0.82
26	3.19	3000000	3.06008E+11	3427510.70	856877.67	0.86
27	3.24	3000000	3.16179E+11	3541436.83	885359.21	0.89
28	3.28	3000000	3.2503E+11	3640570.25	910142.56	0.91
29	2.66	3000000	2.13441E+11	2390689.75	597672.44	0.60
30	3.24	3000000	3.17157E+11	3552384.08	888096.02	0.89
31	3.27	3000000	3.22559E+11	3612895.92	903223.98	0.90
Average=	3.33					0.94
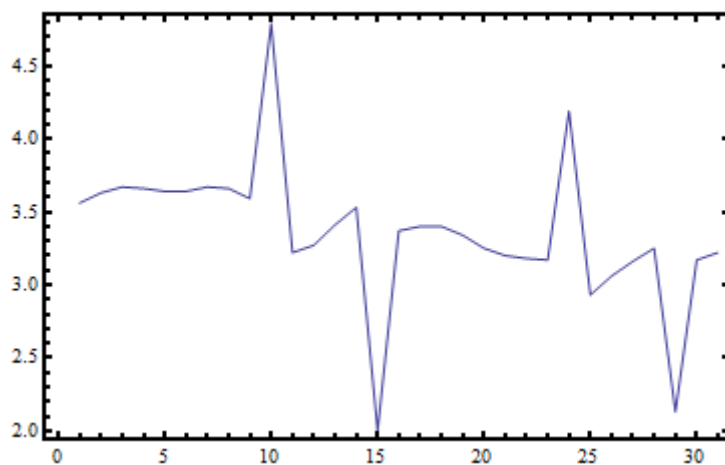
Sandwip Channel October 2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)
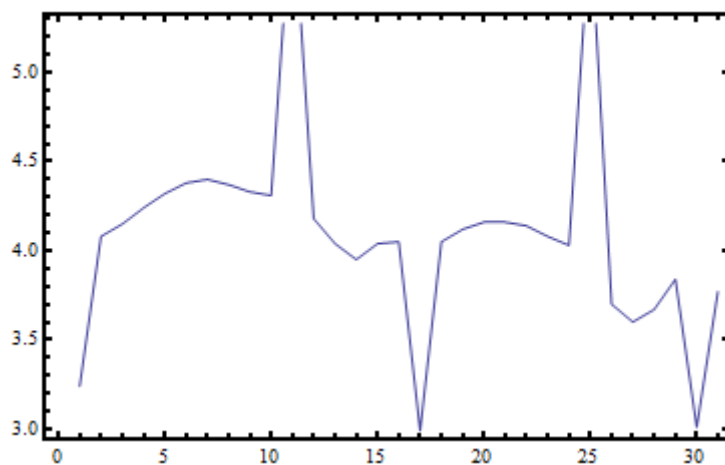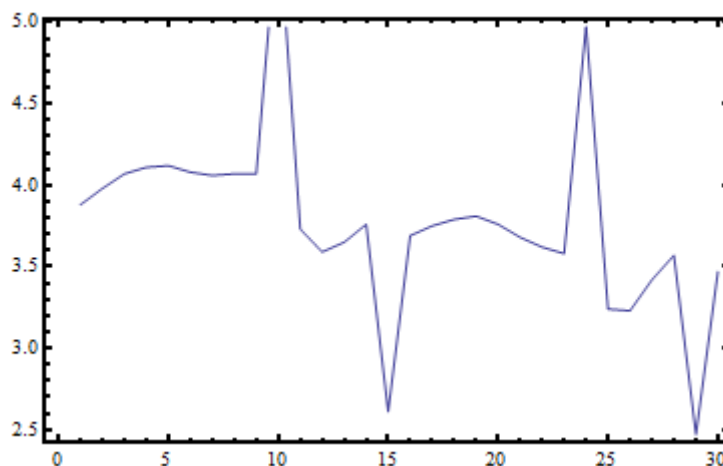
month/year	Nov-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.29	3000000	3.26021E+11	3651669.54	912917.38	0.91
2	3.28	3000000	3.24535E+11	3635026.94	908756.73	0.91
3	3.28	3000000	3.24041E+11	3629487.85	907371.96	0.91
4	3.29	3000000	3.25525E+11	3646117.78	911529.45	0.91
5	3.30	3000000	3.2751E+11	3668350.16	917087.54	0.92
6	3.29	3000000	3.27014E+11	3662785.73	915696.43	0.92
7	3.26	3000000	3.2059E+11	3590832.49	897708.12	0.90
8	3.86	3000000	4.48682E+11	5025556.44	1256389.11	1.26
9	3.12	3000000	2.93645E+11	3289039.84	822259.96	0.82
10	3.13	3000000	2.95059E+11	3304871.54	826217.88	0.83
11	3.18	3000000	3.05528E+11	3422132.10	855533.03	0.86
12	3.24	3000000	3.16668E+11	3546908.35	886727.09	0.89
13	2.48	3000000	1.85531E+11	2078085.00	519521.25	0.52
14	3.19	3000000	3.06008E+11	3427510.70	856877.67	0.86
15	3.19	3000000	3.0697E+11	3438280.56	859570.14	0.86
16	3.17	3000000	3.03611E+11	3400659.96	850164.99	0.85
17	3.14	3000000	2.97896E+11	3336648.96	834162.24	0.83
18	3.11	3000000	2.91297E+11	3262738.15	815684.54	0.82
19	3.10	3000000	2.89425E+11	3241772.81	810443.20	0.81
20	3.10	3000000	2.89425E+11	3241772.81	810443.20	0.81
21	3.10	3000000	2.89425E+11	3241772.81	810443.20	0.81
22	3.65	3000000	4.02618E+11	4509605.43	1127401.36	1.13
23	3.01	3000000	2.72851E+11	3056125.73	764031.43	0.76
24	3.03	3000000	2.77406E+11	3107145.32	776786.33	0.78
25	3.10	3000000	2.90361E+11	3252247.03	813061.76	0.81
26	3.15	3000000	2.9932E+11	3352594.70	838148.67	0.84
27	3.16	3000000	3.00271E+11	3363246.30	840811.57	0.84
28	3.16	3000000	3.01223E+11	3373914.80	843478.70	0.84
29	2.45	3000000	1.81563E+11	2033635.27	508408.82	0.51
30	3.11	3000000	2.91297E+11	3262738.15	815684.54	0.82
Average=	3.16					0.85

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

Sandwip Channel

November

2005

month/year	Dec-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	3.11	3000000	2.92235E+11	3273246.15	818311.54	0.82
2	3.12	3000000	2.93645E+11	3289039.84	822259.96	0.82
3	3.14	3000000	2.96476E+11	3320741.24	830185.31	0.83
4	3.15	3000000	2.98845E+11	3347275.23	836818.81	0.84
5	3.14	3000000	2.97896E+11	3336648.96	834162.24	0.83
6	3.12	3000000	2.93175E+11	3283771.05	820942.76	0.82
7	3.80	3000000	4.3483E+11	4870402.85	1217600.71	1.22
8	2.99	3000000	2.69685E+11	3020663.32	755165.83	0.76
9	2.98	3000000	2.66986E+11	2990431.69	747607.92	0.75
10	3.02	3000000	2.74213E+11	3071387.26	767846.82	0.77
11	3.06	3000000	2.81999E+11	3158587.25	789646.81	0.79
12	3.07	3000000	2.84772E+11	3189655.13	797413.78	0.80
13	2.37	3000000	1.69438E+11	1897827.07	474456.77	0.47
14	3.02	3000000	2.74213E+11	3071387.26	767846.82	0.77
15	3.00	3000000	2.71944E+11	3045972.50	761493.12	0.76
16	2.99	3000000	2.70136E+11	3025716.71	756429.18	0.76
17	3.00	3000000	2.70588E+11	3030774.32	757693.58	0.76
18	3.00	3000000	2.71944E+11	3045972.50	761493.12	0.76
19	3.02	3000000	2.75124E+11	3081582.73	770395.68	0.77
20	3.02	3000000	2.74213E+11	3071387.26	767846.82	0.77
21	3.00	3000000	2.71492E+11	3040902.22	760225.55	0.76
22	3.57	3000000	3.84459E+11	4306221.63	1076555.41	1.08
23	2.91	3000000	2.55447E+11	2861184.90	715296.22	0.72
24	2.90	3000000	2.5282E+11	2831764.17	707941.04	0.71
25	2.94	3000000	2.60297E+11	2915517.79	728879.45	0.73
26	3.01	3000000	2.72397E+11	3051047.01	762761.75	0.76
27	3.01	3000000	2.72397E+11	3051047.01	762761.75	0.76
28	2.99	3000000	2.69685E+11	3020663.32	755165.83	0.76
29	2.28	3000000	1.56814E+11	1756425.12	439106.28	0.44
30	2.97	3000000	2.66089E+11	2980388.26	745097.07	0.75
31	3.0025	3000000	2.71944E+11	3045972.50	761493.12	0.76
Average=	3.02					0.78

| | Sandwip Channel December 2005 |

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

BI: Calculation for Hiron Point during Year 2013

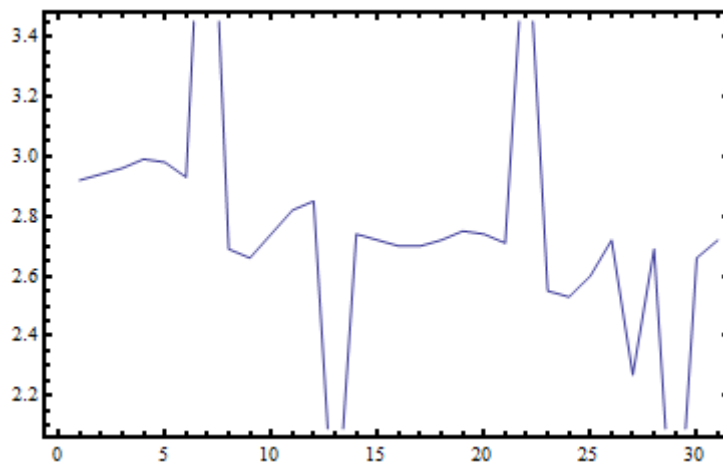| month/year	Jan-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.31	3000000	5.20E+10	582047.69	145511.92	0.15
2	1.45	3000000	6.34E+10	710388.55	177597.14	0.18
3	1.46	3000000	6.43E+10	720220.80	180055.20	0.18
4	1.47	3000000	6.52E+10	730120.62	182530.16	0.18
5	1.50	3000000	6.74E+10	755165.83	188791.46	0.19
6	1.68	3000000	8.48E+10	949846.46	237461.61	0.24
7	1.51	3000000	6.90E+10	772948.77	193237.19	0.19
8	1.51	3000000	6.90E+10	772948.77	193237.19	0.19
9	1.51	3000000	6.88E+10	770395.68	192598.92	0.19
10	1.48	3000000	6.59E+10	737589.84	184397.46	0.18
11	1.43	3000000	6.19E+10	693344.71	173336.18	0.17
12	1.41	3000000	5.98E+10	669355.37	167338.84	0.17
13	1.32	3000000	5.22E+10	584267.13	146066.78	0.15
14	1.43	3000000	6.19E+10	693344.71	173336.18	0.17
15	1.42	3000000	6.10E+10	683698.29	170924.57	0.17
16	1.43	3000000	6.13E+10	686103.56	171525.89	0.17
17	1.41	3000000	6.00E+10	671735.30	167933.82	0.17
18	1.39	3000000	5.85E+10	655164.49	163791.12	0.16
19	1.37	3000000	5.68E+10	636479.84	159119.96	0.16
20	1.37	3000000	5.64E+10	631850.91	157962.73	0.16
21	1.45	3000000	6.31E+10	707126.15	176781.54	0.18
22	1.35	3000000	5.50E+10	615782.70	153945.67	0.15
23	1.34	3000000	5.44E+10	608959.67	152239.92	0.15
24	1.34	3000000	5.38E+10	602174.66	150543.67	0.15
25	1.33	3000000	5.36E+10	599921.44	149980.36	0.15
26	1.34	3000000	5.42E+10	606693.78	151673.45	0.15
27	1.23	3000000	4.53E+10	507028.21	126757.05	0.13
28	0.93	3000000	2.61E+10	292230.70	73057.68	0.07
29	1.51	3000000	6.88E+10	770395.68	192598.92	0.19
30	1.43	3000000	6.15E+10	688513.06	172128.26	0.17
31	1.4375	3000000	6.23E+10	698193.26	174548.32	0.17
Average	1.40		5.99E+10			0.17
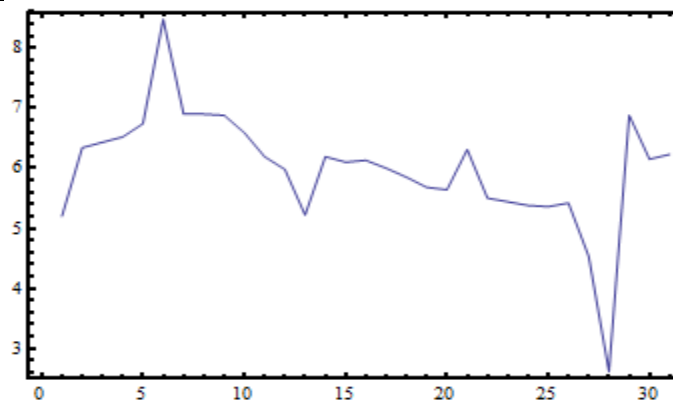
Hiron Point

January

2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

month/year	Feb-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.28	3000000	4.92E+10	551419.05	137854.76	0.14
2	1.28	3000000	4.94E+10	553579.35	138394.84	0.14
3	1.29	3000000	4.98E+10	557912.64	139478.16	0.14
4	1.29	3000000	5.00E+10	560085.62	140021.40	0.14
5	1.42	3000000	6.05E+10	678102.42	169525.61	0.17
6	1.29	3000000	5.02E+10	562262.82	140565.71	0.14
7	1.30	3000000	5.08E+10	568819.77	142204.94	0.14
8	1.29	3000000	5.00E+10	560085.62	140021.40	0.14
9	1.27	3000000	4.88E+10	547111.10	136777.78	0.14
10	1.26	3000000	4.79E+10	536415.15	134103.79	0.13
11	1.25	3000000	4.73E+10	530048.26	132512.07	0.13
12	0.82	3000000	2.03E+10	227189.18	56797.30	0.06
13	1.27	3000000	4.87E+10	544963.47	136240.87	0.14
14	1.28	3000000	4.90E+10	549262.96	137315.74	0.14
15	1.29	3000000	4.98E+10	557912.64	139478.16	0.14
16	1.29	3000000	5.02E+10	562262.82	140565.71	0.14
17	1.30	3000000	5.08E+10	568819.77	142204.94	0.14
18	1.30	3000000	5.10E+10	571013.86	142753.47	0.14
19	1.37	3000000	5.63E+10	631081.07	157770.27	0.16
20	1.30	3000000	5.12E+10	573212.18	143303.04	0.14
21	1.31	3000000	5.20E+10	582047.69	145511.92	0.15
22	1.31	3000000	5.16E+10	577621.49	144405.37	0.14
23	1.29	3000000	5.04E+10	564444.25	141111.06	0.14
24	1.28	3000000	4.94E+10	553579.35	138394.84	0.14
25	1.27	3000000	4.83E+10	540680.86	135170.22	0.14
26	1.25	3000000	4.73E+10	530048.26	132512.07	0.13
27	1.24	3000000	4.66E+10	521618.21	130404.55	0.13
28	0.84	3000000	2.15E+10	240302.61	60075.65	0.06
Average	1.26		4.82E+10			0.13

Hiron Point February 2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

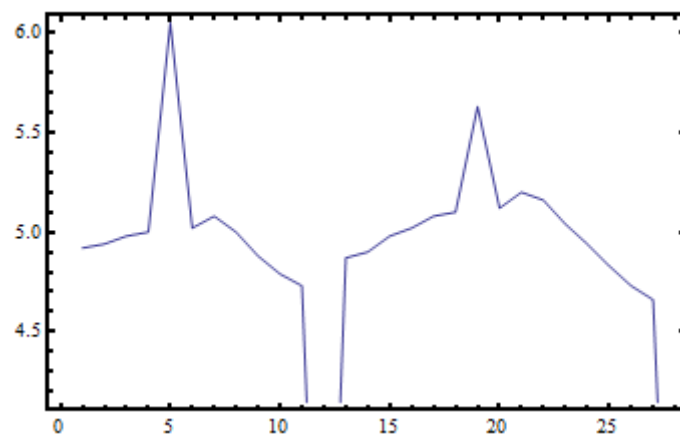| month/year	March-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.60	3000000	7.72E+10	864967.74	216241.94	0.22
2	1.61	3000000	7.77E+10	870382.24	217595.56	0.22
3	1.61	3000000	7.79E+10	873095.82	218273.96	0.22
4	1.62	3000000	7.89E+10	883992.39	220998.10	0.22
5	1.63	3000000	8.04E+10	900463.94	225115.99	0.23
6	1.81	3000000	9.85E+10	1102848.89	275712.22	0.28
7	1.65	3000000	8.16E+10	914306.38	228576.60	0.23
8	1.66	3000000	8.26E+10	925456.36	231364.09	0.23
9	1.64	3000000	8.09E+10	905988.25	226497.06	0.23
10	1.59	3000000	7.65E+10	856877.67	214219.42	0.21
11	1.58	3000000	7.55E+10	846150.05	211537.51	0.21
12	1.60	3000000	7.72E+10	864967.74	216241.94	0.22
13	1.17	3000000	4.11E+10	459889.53	114972.38	0.11
14	1.66	3000000	8.26E+10	925456.36	231364.09	0.23
15	1.66	3000000	8.26E+10	925456.36	231364.09	0.23
16	1.65	3000000	8.16E+10	914306.38	228576.60	0.23
17	1.63	3000000	7.97E+10	892209.16	223052.29	0.22
18	1.61	3000000	7.77E+10	870382.24	217595.56	0.22
19	1.60	3000000	7.72E+10	864967.74	216241.94	0.22
20	1.60	3000000	7.75E+10	867672.88	216918.22	0.22
21	1.64	3000000	8.09E+10	905988.25	226497.06	0.23
22	1.47	3000000	6.54E+10	732606.14	183151.53	0.18
23	1.71	3000000	8.82E+10	987989.13	246997.28	0.25
24	1.74	3000000	9.13E+10	1022959.51	255739.88	0.26
25	1.77	3000000	9.45E+10	1058538.06	264634.52	0.26
26	1.79	3000000	9.69E+10	1085621.10	271405.27	0.27
27	1.82	3000000	9.94E+10	1113046.23	278261.56	0.28
28	1.44	3000000	6.28E+10	703058.70	175764.68	0.18
29	1.85	3000000	1.03E+11	1156387.54	289096.88	0.29
30	1.86	3000000	1.04E+11	1168922.81	292230.70	0.29
31	1.8575	3000000	1.04E+11	1165782.66	291445.66	0.29
Average	1.65		8.25E+10			0.23

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

month/year	Apr-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.41	3000000	5.98E+10	669355.37	167338.84	0.17
2	1.42	3000000	6.06E+10	678900.43	169725.11	0.17
3	1.42	3000000	6.04E+10	676507.83	169126.96	0.17
4	1.60	3000000	7.72E+10	864967.74	216241.94	0.22
5	1.44	3000000	6.23E+10	698193.26	174548.32	0.17
6	1.46	3000000	6.45E+10	722689.42	180672.35	0.18
7	1.46	3000000	6.45E+10	722689.42	180672.35	0.18
8	1.47	3000000	6.50E+10	727639.33	181909.83	0.18
9	1.48	3000000	6.56E+10	735095.88	183773.97	0.18
10	1.49	3000000	6.65E+10	745097.07	186274.27	0.19
11	1.43	3000000	6.13E+10	686103.56	171525.89	0.17
12	1.50	3000000	6.79E+10	760225.55	190056.39	0.19
13	1.19	3000000	4.27E+10	478469.07	119617.27	0.12
14	1.53	3000000	7.08E+10	793525.55	198381.39	0.20
15	1.54	3000000	7.13E+10	798711.97	199677.99	0.20
16	1.55	3000000	7.20E+10	806523.29	201630.82	0.20
17	1.55	3000000	7.25E+10	811751.95	202937.99	0.20
18	1.54	3000000	7.18E+10	803915.29	200978.82	0.20
19	1.53	3000000	7.08E+10	793525.55	198381.39	0.20
20	1.72	3000000	8.89E+10	995707.77	248926.94	0.25
21	1.58	3000000	7.51E+10	840811.57	210202.89	0.21
22	1.59	3000000	7.58E+10	848825.62	212206.40	0.21
23	1.59	3000000	7.60E+10	851505.41	212876.35	0.21
24	1.59	3000000	7.58E+10	848825.62	212206.40	0.21
25	1.58	3000000	7.55E+10	846150.05	211537.51	0.21
26	1.58	3000000	7.51E+10	840811.57	210202.89	0.21
27	1.57	3000000	7.46E+10	835490.00	208872.50	0.21
28	1.21	3000000	4.42E+10	494687.22	123671.80	0.12
29	1.59	3000000	7.65E+10	856877.67	214219.42	0.21
30	1.61	3000000	7.77E+10	870382.24	217595.56	0.22
Average	1.51					0.19

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)
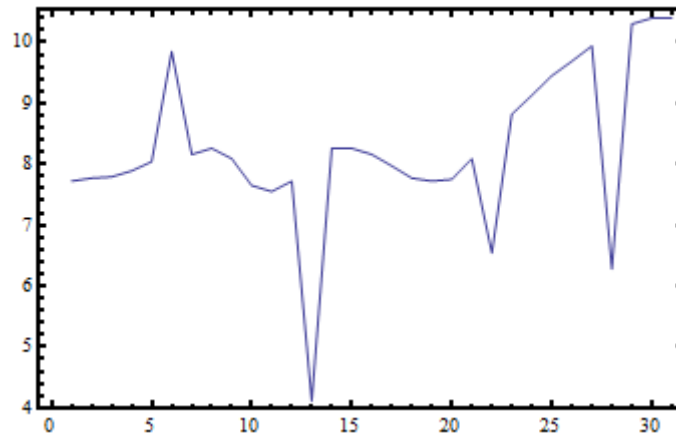
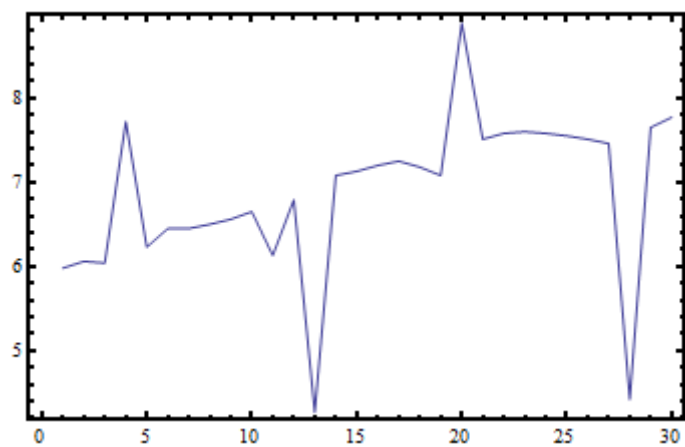| month/year	May-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.62	3000000	7.87E+10	881261.91	220315.48	0.22
2	1.62	3000000	7.87E+10	881261.91	220315.48	0.22
3	1.61	3000000	7.84E+10	878535.66	219633.91	0.22
4	1.88	3000000	1.06E+11	1189965.11	297491.28	0.30
5	1.66	3000000	8.31E+10	931056.68	232764.17	0.23
6	1.68	3000000	8.46E+10	947959.03	236989.76	0.24
7	1.69	3000000	8.59E+10	962160.47	240540.12	0.24
8	1.70	3000000	8.67E+10	970732.01	242683.00	0.24
9	1.71	3000000	8.79E+10	985102.39	246275.60	0.25
10	1.72	3000000	8.90E+10	996674.71	249168.68	0.25
11	1.72	3000000	8.95E+10	1002486.21	250621.55	0.25
12	1.72	3000000	8.95E+10	1002486.21	250621.55	0.25
13	1.45	3000000	6.34E+10	710388.55	177597.14	0.18
14	1.74	3000000	9.11E+10	1020022.08	255005.52	0.26
15	1.74	3000000	9.08E+10	1017088.88	254272.22	0.25
16	1.74	3000000	9.08E+10	1017088.88	254272.22	0.25
17	1.73	3000000	9.05E+10	1014159.90	253539.97	0.25
18	1.73	3000000	8.98E+10	1005398.30	251349.57	0.25
19	1.72	3000000	8.92E+10	999578.35	249894.59	0.25
20	1.98	3000000	1.19E+11	1329080.75	332270.19	0.33
21	1.77	3000000	9.45E+10	1058538.06	264634.52	0.26
22	1.79	3000000	9.61E+10	1076555.41	269138.85	0.27
23	1.78	3000000	9.58E+10	1073541.96	268385.49	0.27
24	1.78	3000000	9.56E+10	1070532.73	267633.18	0.27
25	1.77	3000000	9.48E+10	1061530.39	265382.60	0.27
26	1.76	3000000	9.37E+10	1049586.41	262396.60	0.26
27	1.41	3000000	5.97E+10	668563.00	167140.75	0.17
28	1.78	3000000	9.50E+10	1064526.95	266131.74	0.27
29	1.78	3000000	9.56E+10	1070532.73	267633.18	0.27
30	1.79	3000000	9.64E+10	1079573.08	269893.27	0.27
31	1.7925	3000000	9.69E+10	1085621.10	271405.27	0.27
Average	1.72					0.25

Hiron Point

May

2013

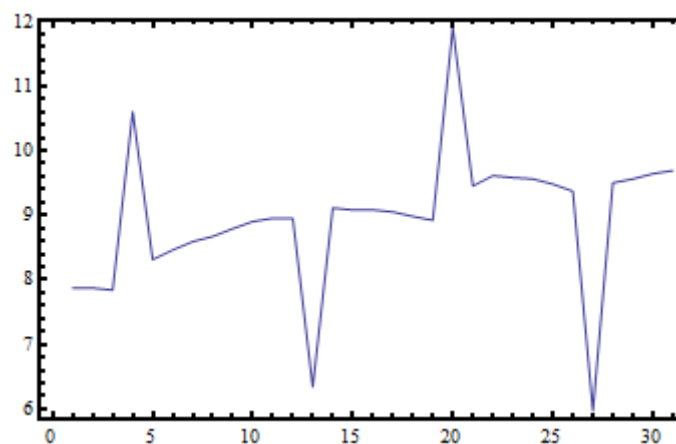Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

month/year	Jun-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1.80	3000000	9.75E+10	1091686.01	272921.50	0.27	1.80
2.06	3000000	1.28E+11	1429182.75	357295.69	0.36	2.06
1.83	3000000	1.00E+11	1125344.99	281336.25	0.28	1.83
1.85	3000000	1.03E+11	1156387.54	289096.88	0.29	1.85
1.87	3000000	1.05E+11	1175215.79	293803.95	0.29	1.87
1.87	3000000	1.06E+11	1184686.93	296171.73	0.30	1.87
1.88	3000000	1.07E+11	1194196.09	298549.02	0.30	1.88
1.88	3000000	1.07E+11	1197374.25	299343.56	0.30	1.88
1.89	3000000	1.07E+11	1200556.64	300139.16	0.30	1.89
1.88	3000000	1.07E+11	1197374.25	299343.56	0.30	1.88
1.59	3000000	7.66E+10	857774.69	214443.67	0.21	1.59
1.87	3000000	1.06E+11	1184686.93	296171.73	0.30	1.87
1.87	3000000	1.05E+11	1175215.79	293803.95	0.29	1.87
1.86	3000000	1.05E+11	1172067.19	293016.80	0.29	1.86
1.86	3000000	1.04E+11	1165782.66	291445.66	0.29	1.86
1.85	3000000	1.04E+11	1159515.02	289878.76	0.29	1.85
1.85	3000000	1.03E+11	1156387.54	289096.88	0.29	1.85
1.85	3000000	1.04E+11	1159515.02	289878.76	0.29	1.85
2.16	3000000	1.40E+11	1571542.02	392885.51	0.39	2.16
1.90	3000000	1.09E+11	1216531.94	304132.98	0.30	1.90
1.90	3000000	1.09E+11	1222951.62	305737.91	0.31	1.90
1.90	3000000	1.09E+11	1219739.67	304934.92	0.30	1.90
1.89	3000000	1.08E+11	1210129.15	302532.29	0.30	1.89
1.89	3000000	1.07E+11	1200556.64	300139.16	0.30	1.89
1.51	3000000	6.91E+10	773800.74	193450.19	0.19	1.51
1.88	3000000	1.07E+11	1194196.09	298549.02	0.30	1.88
1.89	3000000	1.07E+11	1200556.64	300139.16	0.30	1.89
1.89	3000000	1.08E+11	1210129.15	302532.29	0.30	1.89
1.90	3000000	1.09E+11	1222951.62	305737.91	0.31	1.90
1.91	3000000	1.10E+11	1229388.20	307347.05	0.31	1.91
Average	1.87					0.30

Hiron Point

Jun

2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

month/year	july-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.92	3000000	1.11E+11	1239074.74	309768.68	0.31
2	2.14	3000000	1.38E+11	1547346.20	386836.55	0.39
3	1.93	3000000	1.13E+11	1261824.49	315456.12	0.32
4	1.96	3000000	1.15E+11	1291378.26	322844.56	0.32
5	1.97	3000000	1.16E+11	1304623.07	326155.77	0.33
6	1.97	3000000	1.17E+11	1307944.84	326986.21	0.33
7	1.97	3000000	1.16E+11	1304623.07	326155.77	0.33
8	1.96	3000000	1.16E+11	1297992.22	324498.05	0.32
9	1.95	3000000	1.15E+11	1288077.61	322019.40	0.32
10	1.94	3000000	1.14E+11	1271637.73	317909.43	0.32
11	1.94	3000000	1.13E+11	1268362.43	317090.61	0.32
12	1.92	3000000	1.11E+11	1248799.29	312199.82	0.31
13	1.92	3000000	1.11E+11	1242312.03	310578.01	0.31
14	1.91	3000000	1.10E+11	1235841.67	308960.42	0.31
15	1.91	3000000	1.10E+11	1232612.82	308153.21	0.31
16	1.92	3000000	1.11E+11	1239074.74	309768.68	0.31
17	1.91	3000000	1.10E+11	1235841.67	308960.42	0.31
18	2.18	3000000	1.44E+11	1610645.77	402661.44	0.40
19	1.94	3000000	1.14E+11	1271637.73	317909.43	0.32
20	1.97	3000000	1.17E+11	1314601.03	328650.26	0.33
21	1.95	3000000	1.15E+11	1288077.61	322019.40	0.32
22	1.92	3000000	1.11E+11	1239074.74	309768.68	0.31
23	1.94	3000000	1.13E+11	1265091.35	316272.84	0.32
24	1.93	3000000	1.12E+11	1255303.44	313825.86	0.31
25	1.55	3000000	7.25E+10	811751.95	202937.99	0.20
26	1.94	3000000	1.13E+11	1268362.43	317090.61	0.32
27	1.94	3000000	1.14E+11	1274917.26	318729.32	0.32
28	2.00	3000000	1.20E+11	1348135.43	337033.86	0.34
29	1.95	3000000	1.15E+11	1288077.61	322019.40	0.32
30	1.96	3000000	1.16E+11	1297992.22	324498.05	0.32
31	1.9625	3000000	1.16E+11	1301305.53	325326.38	0.33
Average	1.94					0.32

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

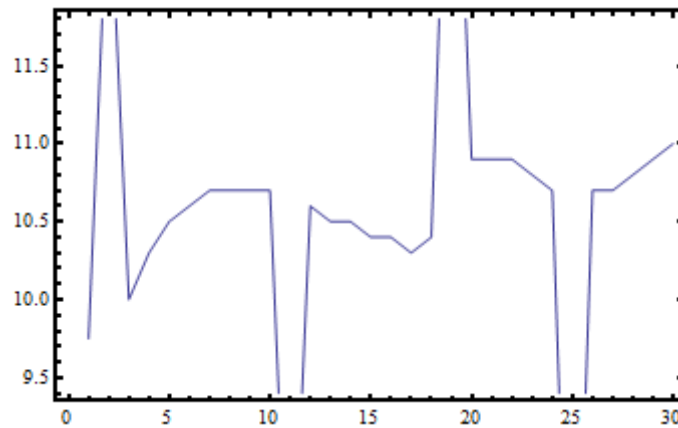| month/year	Aug-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.14	3000000	1.38E+11	1547346.20	386836.55	0.39
2	2.23	3000000	1.50E+11	1684003.08	421000.77	0.42
3	2.00	3000000	1.20E+11	1344762.98	336190.75	0.34
4	2.00	3000000	1.20E+11	1348135.43	337033.86	0.34
5	1.99	3000000	1.19E+11	1338030.76	334507.69	0.33
6	1.98	3000000	1.19E+11	1327964.11	331991.03	0.33
7	1.98	3000000	1.18E+11	1317935.47	329483.87	0.33
8	1.97	3000000	1.17E+11	1307944.84	326986.21	0.33
9	1.95	3000000	1.14E+11	1281488.99	320372.25	0.32
10	1.59	3000000	7.59E+10	850611.68	212652.92	0.21
11	1.94	3000000	1.14E+11	1271637.73	317909.43	0.32
12	1.94	3000000	1.13E+11	1265091.35	316272.84	0.32
13	1.76	3000000	9.32E+10	1043639.75	260909.94	0.26
14	1.94	3000000	1.14E+11	1274917.26	318729.32	0.32
15	1.94	3000000	1.14E+11	1274917.26	318729.32	0.32
16	2.17	3000000	1.42E+11	1591033.83	397758.46	0.40
17	1.95	3000000	1.15E+11	1284781.19	321195.30	0.32
18	1.97	3000000	1.17E+11	1307944.84	326986.21	0.33
19	1.97	3000000	1.17E+11	1314601.03	328650.26	0.33
20	1.97	3000000	1.17E+11	1307944.84	326986.21	0.33
21	1.97	3000000	1.16E+11	1304623.07	326155.77	0.33
22	1.96	3000000	1.16E+11	1297992.22	324498.05	0.32
23	1.95	3000000	1.15E+11	1284781.19	321195.30	0.32
24	1.57	3000000	7.44E+10	832835.54	208208.89	0.21
25	1.97	3000000	1.17E+11	1314601.03	328650.26	0.33
26	1.98	3000000	1.18E+11	1317935.47	329483.87	0.33
27	1.98	3000000	1.18E+11	1324617.01	331154.25	0.33
28	1.98	3000000	1.19E+11	1327964.11	331991.03	0.33
29	1.99	3000000	1.19E+11	1331315.44	332828.86	0.33
30	1.98	3000000	1.18E+11	1317935.47	329483.87	0.33
31	2.136667	3000000	1.38E+11	1542529.56	385632.39	0.39
Average	1.96					0.33

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

Hiron Point

August

2013

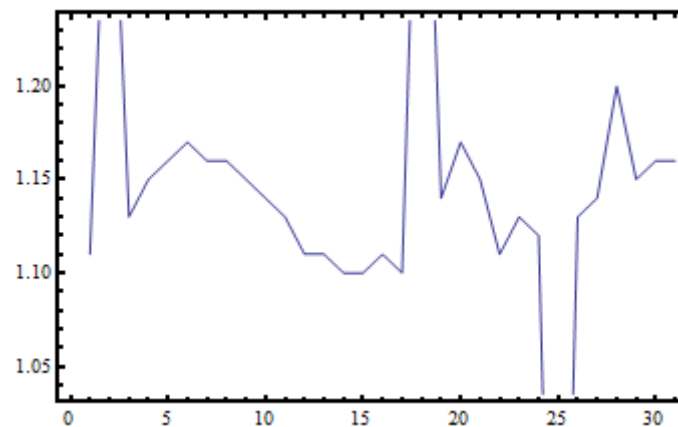| month/year				Sep-13		
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.01	3000000	1.21E+11	1358278.10	339569.53	0.34
2	2.01	3000000	1.21E+11	1358278.10	339569.53	0.34
3	2.00	3000000	1.21E+11	1351512.10	337878.02	0.34
4	1.99	3000000	1.20E+11	1341394.76	335348.69	0.34
5	1.99	3000000	1.19E+11	1331315.44	332828.86	0.33
6	1.98	3000000	1.18E+11	1317935.47	329483.87	0.33
7	1.96	3000000	1.16E+11	1301305.53	325326.38	0.33
8	1.95	3000000	1.15E+11	1284781.19	321195.30	0.32
9	1.56	3000000	7.31E+10	818749.78	204687.45	0.20
10	1.95	3000000	1.15E+11	1288077.61	322019.40	0.32
11	1.96	3000000	1.15E+11	1291378.26	322844.56	0.32
12	1.96	3000000	1.16E+11	1297992.22	324498.05	0.32
13	1.96	3000000	1.15E+11	1291378.26	322844.56	0.32
14	2.18	3000000	1.44E+11	1610645.77	402661.44	0.40
15	1.71	3000000	8.82E+10	987989.13	246997.28	0.25
16	1.98	3000000	1.18E+11	1317935.47	329483.87	0.33
17	1.98	3000000	1.18E+11	1321274.13	330318.53	0.33
18	1.98	3000000	1.18E+11	1317935.47	329483.87	0.33
19	1.98	3000000	1.18E+11	1317935.47	329483.87	0.33
20	1.97	3000000	1.17E+11	1311270.82	327817.71	0.33
21	1.97	3000000	1.17E+11	1307944.84	326986.21	0.33
22	1.57	3000000	7.40E+10	829302.84	207325.71	0.21
23	1.99	3000000	1.19E+11	1331315.44	332828.86	0.33
24	1.99	3000000	1.19E+11	1334670.99	333667.75	0.33
25	1.99	3000000	1.19E+11	1338030.76	334507.69	0.33
26	1.99	3000000	1.20E+11	1341394.76	335348.69	0.34
27	1.99	3000000	1.19E+11	1334670.99	333667.75	0.33
28	1.98	3000000	1.18E+11	1317935.47	329483.87	0.33
29	2.09	3000000	1.32E+11	1480596.52	370149.13	0.37
30	1.99	3000000	1.19E+11	1334670.99	333667.75	0.33
Average	1.95					0.32

Hiron Point

September

2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=$1x10^{10}$ J)
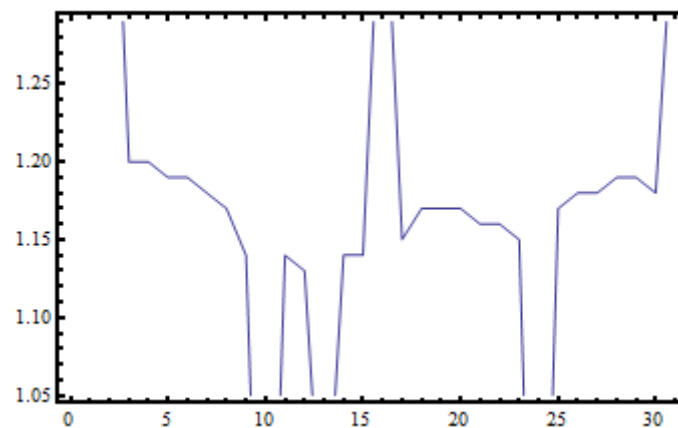
month/year	Oct-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.99	3000000	1.20E+11	1341394.76	335348.69	0.34
2	1.99	3000000	1.19E+11	1338030.76	334507.69	0.33
3	1.98	3000000	1.19E+11	1327964.11	331991.03	0.33
4	1.97	3000000	1.17E+11	1307944.84	326986.21	0.33
5	1.96	3000000	1.16E+11	1294683.12	323670.78	0.32
6	1.95	3000000	1.14E+11	1278201.01	319550.25	0.32
7	1.93	3000000	1.12E+11	1258561.85	314640.46	0.31
8	1.51	3000000	6.85E+10	766998.13	191749.53	0.19
9	1.94	3000000	1.13E+11	1265091.35	316272.84	0.32
10	1.94	3000000	1.13E+11	1265091.35	316272.84	0.32
11	1.94	3000000	1.13E+11	1268362.43	317090.61	0.32
12	1.93	3000000	1.12E+11	1255303.44	313825.86	0.31
13	2.10	3000000	1.33E+11	1490042.09	372510.52	0.37
14	1.93	3000000	1.12E+11	1258561.85	314640.46	0.31
15	1.95	3000000	1.14E+11	1278201.01	319550.25	0.32
16	1.94	3000000	1.14E+11	1274917.26	318729.32	0.32
17	1.94	3000000	1.14E+11	1271637.73	317909.43	0.32
18	1.94	3000000	1.13E+11	1268362.43	317090.61	0.32
19	1.81	3000000	9.86E+10	1103866.51	275966.63	0.28
20	1.93	3000000	1.13E+11	1261824.49	315456.12	0.32
21	1.93	3000000	1.12E+11	1255303.44	313825.86	0.31
22	1.55	3000000	7.28E+10	815247.11	203811.78	0.20
23	1.95	3000000	1.14E+11	1278201.01	319550.25	0.32
24	1.94	3000000	1.14E+11	1271637.73	317909.43	0.32
25	1.94	3000000	1.13E+11	1265091.35	316272.84	0.32
26	1.93	3000000	1.12E+11	1258561.85	314640.46	0.31
27	1.92	3000000	1.11E+11	1242312.03	310578.01	0.31
28	1.90	3000000	1.08E+11	1213328.43	303332.11	0.30
29	2.04	3000000	1.26E+11	1406113.19	351528.30	0.35
30	1.92	3000000	1.11E+11	1248799.29	312199.82	0.31
31	1.92	3000000	1.11E+11	1242312.03	310578.01	0.31
Average	1.92					0.31

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

Hiron Point

October

2013

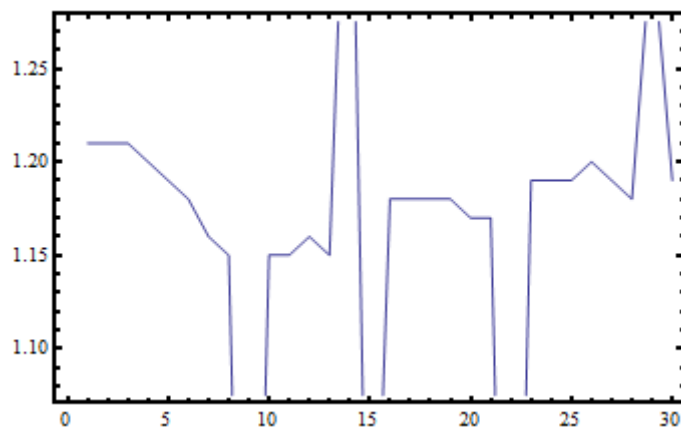| month/year			Nov-13			
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.91	3000000	1.09E+11	1226167.80	306541.95	0.31
2	1.89	3000000	1.08E+11	1206934.09	301733.52	0.30
3	1.87	3000000	1.05E+11	1181525.66	295381.42	0.30
4	1.85	3000000	1.04E+11	1159515.02	289878.76	0.29
5	1.84	3000000	1.02E+11	1137711.33	284427.83	0.28
6	1.40	3000000	5.91E+10	662240.93	165560.23	0.17
7	1.84	3000000	1.02E+11	1137711.33	284427.83	0.28
8	1.83	3000000	1.01E+11	1134613.41	283653.35	0.28
9	1.83	3000000	1.01E+11	1128430.24	282107.56	0.28
10	1.82	3000000	9.99E+10	1119187.17	279796.79	0.28
11	1.81	3000000	9.86E+10	1103866.51	275966.63	0.28
12	2.01	3000000	1.22E+11	1365061.01	341265.25	0.34
13	1.83	3000000	1.01E+11	1134613.41	283653.35	0.28
14	1.83	3000000	1.01E+11	1131519.72	282879.93	0.28
15	1.83	3000000	1.01E+11	1128430.24	282107.56	0.28
16	1.82	3000000	1.00E+11	1122263.97	280565.99	0.28
17	1.82	3000000	9.96E+10	1116114.59	279028.65	0.28
18	1.81	3000000	9.86E+10	1103866.51	275966.63	0.28
19	1.80	3000000	9.77E+10	1094724.80	273681.20	0.27
20	1.79	3000000	9.69E+10	1085621.10	271405.27	0.27
21	1.44	3000000	6.28E+10	703871.25	175967.81	0.18
22	1.79	3000000	9.69E+10	1085621.10	271405.27	0.27
23	1.78	3000000	9.56E+10	1070532.73	267633.18	0.27
24	1.77	3000000	9.45E+10	1058538.06	264634.52	0.26
25	1.76	3000000	9.32E+10	1043639.75	260909.94	0.26
26	1.74	3000000	9.13E+10	1022959.51	255739.88	0.26
27	1.75	3000000	9.24E+10	1034751.45	258687.86	0.26
28	1.89	3000000	1.07E+11	1202680.58	300670.15	0.30
29	1.75	3000000	9.19E+10	1028847.03	257211.76	0.26
30	1.74	3000000	9.11E+10	1020022.08	255005.52	0.26
Average	1.79					0.27

Hiron Point

November

2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

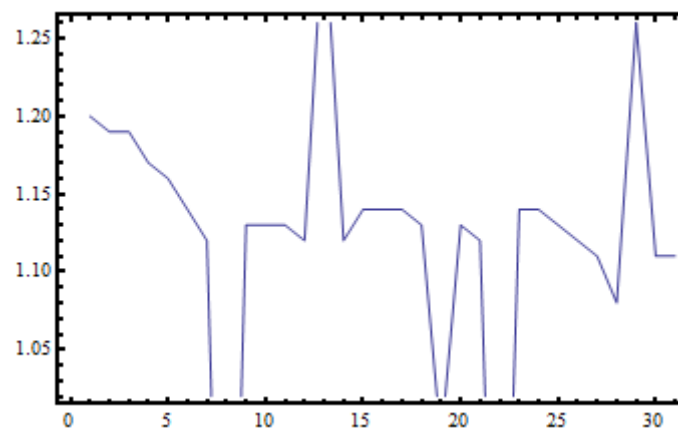| month/year	Dec-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.72	3000000	8.87E+10	993775.29	248443.82	0.25
2	1.70	3000000	8.67E+10	970732.01	242683.00	0.24
3	1.67	3000000	8.44E+10	945131.41	236282.85	0.24
4	1.65	3000000	8.24E+10	922662.53	230665.63	0.23
5	1.20	3000000	4.34E+10	486544.35	121636.09	0.12
6	1.64	3000000	8.14E+10	911529.45	227882.36	0.23
7	1.64	3000000	8.14E+10	911529.45	227882.36	0.23
8	1.64	3000000	8.11E+10	908756.73	227189.18	0.23
9	1.64	3000000	8.09E+10	905988.25	226497.06	0.23
10	1.63	3000000	8.04E+10	900463.94	225115.99	0.23
11	1.80	3000000	9.77E+10	1094724.80	273681.20	0.27
12	1.64	3000000	8.09E+10	905988.25	226497.06	0.23
13	1.65	3000000	8.16E+10	914306.38	228576.60	0.23
14	1.50	3000000	6.78E+10	759212.26	189803.06	0.19
15	1.63	3000000	7.99E+10	894956.53	223739.13	0.22
16	1.62	3000000	7.94E+10	889466.01	222366.50	0.22
17	1.61	3000000	7.82E+10	875813.63	218953.41	0.22
18	1.60	3000000	7.67E+10	859570.14	214892.54	0.21
19	1.59	3000000	7.58E+10	848825.62	212206.40	0.21
20	1.21	3000000	4.44E+10	497416.52	124354.13	0.12
21	1.57	3000000	7.44E+10	832835.54	208208.89	0.21
22	1.55	3000000	7.27E+10	814372.62	203593.15	0.20
23	1.54	3000000	7.15E+10	801311.52	200327.88	0.20
24	1.53	3000000	7.04E+10	788356.01	197089.00	0.20
25	1.52	3000000	6.95E+10	778067.63	194516.91	0.19
26	1.51	3000000	6.88E+10	770395.68	192598.92	0.19
27	1.64	3000000	8.15E+10	912454.62	228113.66	0.23
28	1.52	3000000	6.92E+10	775506.09	193876.52	0.19
29	1.51	3000000	6.88E+10	770395.68	192598.92	0.19
30	1.49	3000000	6.67E+10	747607.92	186901.98	0.19
31	1.48	3000000	6.56E+10	735095.88	183773.97	0.18
Average	1.57					0.21

Hiron Point December 2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

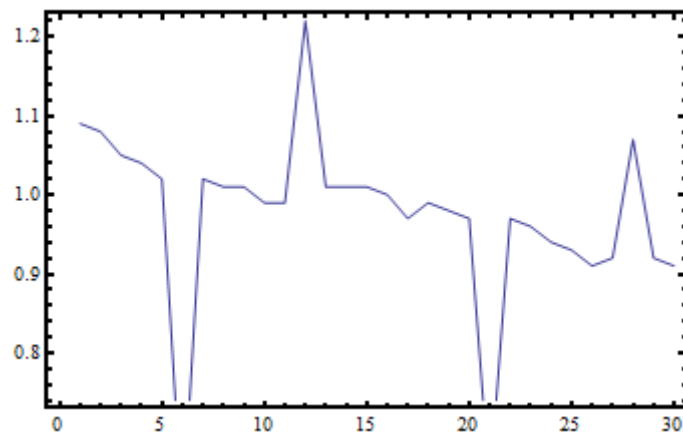# BII: Calculation for Hiron Point during Year 2009

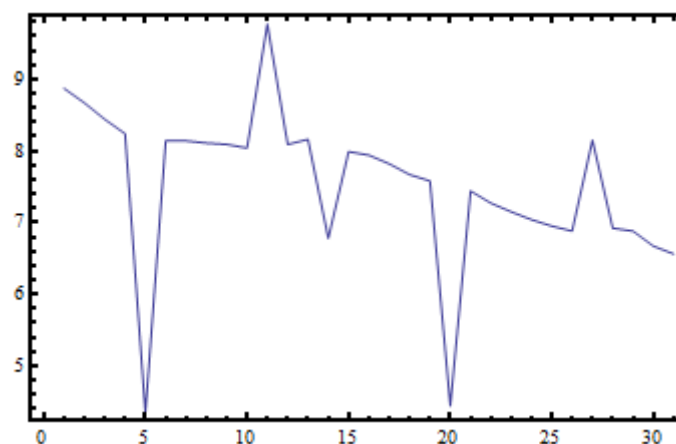| month/year	Jan-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.46	3000000	6.45E+10	722689.42	180672.35	0.18
2	1.45	3000000	6.34E+10	710388.55	177597.14	0.18
3	1.45	3000000	6.30E+10	705497.76	176374.44	0.18
4	1.44	3000000	6.26E+10	700623.87	175155.97	0.18
5	1.44	3000000	6.26E+10	700623.87	175155.97	0.18
6	1.57	3000000	7.40E+10	829302.84	207325.71	0.21
7	2.18	3000000	1.43E+11	1605731.52	401432.88	0.40
8	1.44	3000000	6.21E+10	695766.87	173941.72	0.17
9	1.42	3000000	6.10E+10	683698.29	170924.57	0.17
10	1.40	3000000	5.93E+10	664608.19	166152.05	0.17
11	1.39	3000000	5.79E+10	648126.07	162031.52	0.16
12	1.37	3000000	5.62E+10	629542.78	157385.70	0.16
13	0.91	3000000	2.52E+10	281850.34	70462.58	0.07
14	1.36	3000000	5.60E+10	627238.88	156809.72	0.16
15	1.37	3000000	5.64E+10	631850.91	157962.73	0.16
16	1.55	3000000	7.22E+10	809135.51	202283.88	0.20
17	1.38	3000000	5.72E+10	641125.66	160281.42	0.16
18	1.38	3000000	5.77E+10	645788.38	161447.09	0.16
19	1.38	3000000	5.74E+10	643454.91	160863.73	0.16
20	1.47	3000000	6.49E+10	726813.17	181703.29	0.18
21	1.39	3000000	5.83E+10	652814.13	163203.53	0.16
22	1.39	3000000	5.83E+10	652814.13	163203.53	0.16
23	1.38	3000000	5.77E+10	645788.38	161447.09	0.16
24	1.37	3000000	5.66E+10	634163.26	158540.82	0.16
25	1.36	3000000	5.56E+10	622643.73	155660.93	0.16
26	1.33	3000000	5.36E+10	599921.44	149980.36	0.15
27	1.31	3000000	5.20E+10	582047.69	145511.92	0.15
28	0.91	3000000	2.50E+10	279796.79	69949.20	0.07
29	1.29	3000000	5.02E+10	562262.82	140565.71	0.14
30	1.29	3000000	5.00E+10	560085.62	140021.40	0.14
31	1.29	3000000	4.98E+10	557912.64	139478.16	0.14
Average	1.39		5.95E+10			0.17

Hiron Point

January

2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

month/year	Feb-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.29	3000000	5.00E+10	560085.62	140021.40	0.14
2	1.29	3000000	5.00E+10	560085.62	140021.40	0.14
3	1.29	3000000	5.04E+10	564444.25	141111.06	0.14
4	1.40	3000000	5.91E+10	662240.93	165560.23	0.17
5	1.29	3000000	5.00E+10	560085.62	140021.40	0.14
6	1.30	3000000	5.10E+10	571013.86	142753.47	0.14
7	1.29	3000000	5.04E+10	564444.25	141111.06	0.14
8	1.28	3000000	4.94E+10	553579.35	138394.84	0.14
9	1.26	3000000	4.81E+10	538545.89	134636.47	0.13
10	1.26	3000000	4.79E+10	536415.15	134103.79	0.13
11	0.85	3000000	2.16E+10	242205.98	60551.50	0.06
12	1.26	3000000	4.81E+10	538545.89	134636.47	0.13
13	1.27	3000000	4.88E+10	547111.10	136777.78	0.14
14	1.28	3000000	4.92E+10	551419.05	137854.76	0.14
15	1.29	3000000	4.98E+10	557912.64	139478.16	0.14
16	1.30	3000000	5.06E+10	566629.89	141657.47	0.14
17	1.30	3000000	5.12E+10	573212.18	143303.04	0.14
18	1.36	3000000	5.58E+10	624939.19	156234.80	0.16
19	1.30	3000000	5.12E+10	573212.18	143303.04	0.14
20	1.32	3000000	5.28E+10	590950.78	147737.69	0.15
21	1.32	3000000	5.24E+10	586490.79	146622.70	0.15
22	1.31	3000000	5.14E+10	575414.72	143853.68	0.14
23	1.29	3000000	4.98E+10	557912.64	139478.16	0.14
24	1.27	3000000	4.88E+10	547111.10	136777.78	0.14
25	1.26	3000000	4.81E+10	538545.89	134636.47	0.13
26	1.25	3000000	4.69E+10	525824.79	131456.20	0.13
27	1.24	3000000	4.66E+10	521618.21	130404.55	0.13
28	0.87	3000000	2.28E+10	255739.88	63934.97	0.06
Average	1.26		4.83E+10			0.14
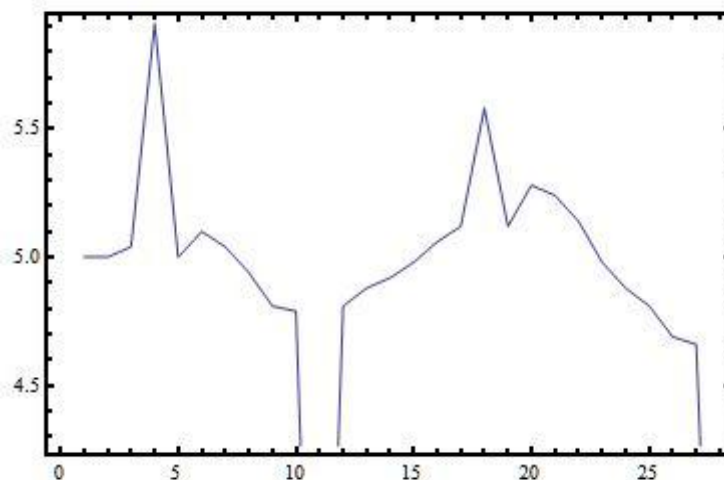
Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

Hiron Point

February

2009

month/year	March-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.27	3000000	4.83E+10	540680.86	135170.22	0.14
2	1.34	3000000	5.42E+10	606693.78	151673.45	0.15
3	1.28	3000000	4.94E+10	553579.35	138394.84	0.14
4	1.29	3000000	5.04E+10	564444.25	141111.06	0.14
5	1.39	3000000	5.86E+10	655948.89	163987.22	0.16
6	1.26	3000000	4.82E+10	539612.85	134903.21	0.13
7	1.31	3000000	5.18E+10	579832.48	144958.12	0.14
8	1.31	3000000	5.18E+10	579832.48	144958.12	0.14
9	1.30	3000000	5.08E+10	568819.77	142204.94	0.14
10	1.29	3000000	5.02E+10	562262.82	140565.71	0.14
11	1.29	3000000	5.02E+10	562262.82	140565.71	0.14
12	1.29	3000000	5.04E+10	564444.25	141111.06	0.14
13	0.90	3000000	2.44E+10	273681.20	68420.30	0.07
14	1.34	3000000	5.38E+10	602174.66	150543.67	0.15
15	1.34	3000000	5.44E+10	608959.67	152239.92	0.15
16	1.35	3000000	5.52E+10	618065.49	154516.37	0.15
17	1.36	3000000	5.60E+10	627238.88	156809.72	0.16
18	1.37	3000000	5.68E+10	636479.84	159119.96	0.16
19	1.37	3000000	5.66E+10	634163.26	158540.82	0.16
20	1.45	3000000	6.31E+10	707126.15	176781.54	0.18
21	1.39	3000000	5.85E+10	655164.49	163791.12	0.16
22	1.40	3000000	5.87E+10	657519.08	164379.77	0.16
23	1.39	3000000	5.81E+10	650467.99	162617.00	0.16
24	1.38	3000000	5.77E+10	645788.38	161447.09	0.16
25	1.38	3000000	5.70E+10	638800.64	159700.16	0.16
26	1.37	3000000	5.68E+10	636479.84	159119.96	0.16
27	1.37	3000000	5.66E+10	634163.26	158540.82	0.16
28	1.37	3000000	5.64E+10	631850.91	157962.73	0.16
29	1.00	3000000	3.04E+10	340134.30	85033.57	0.09
30	1.39	3000000	5.85E+10	655164.49	163791.12	0.16
31	1.40	3000000	5.91E+10	662240.93	165560.23	0.17
Average	1.39					0.15

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

Hiron Point

March

2009
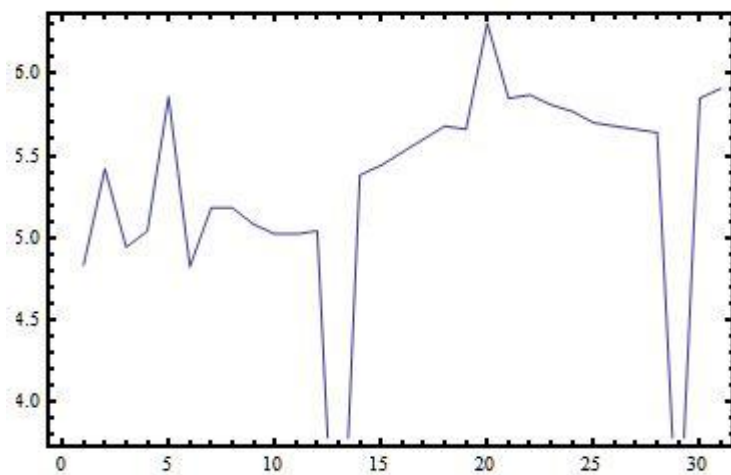
month/year	Apr-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.42	3000000	6.04E+10	676507.83	169126.96	0.17
2	1.64	3000000	8.14E+10	911529.45	227882.36	0.23
3	1.64	3000000	8.06E+10	903223.98	225806.00	0.23
4	1.56	3000000	7.31E+10	818749.78	204687.45	0.20
5	1.43	3000000	6.15E+10	688513.06	172128.26	0.17
6	1.45	3000000	6.34E+10	710388.55	177597.14	0.18
7	1.46	3000000	6.39E+10	715296.22	178824.06	0.18
8	1.46	3000000	6.41E+10	717756.40	179439.10	0.18
9	1.46	3000000	6.45E+10	722689.42	180672.35	0.18
10	1.47	3000000	6.54E+10	732606.14	183151.53	0.18
11	1.48	3000000	6.59E+10	737589.84	184397.46	0.18
12	1.49	3000000	6.65E+10	745097.07	186274.27	0.19
13	1.18	3000000	4.22E+10	473123.09	118280.77	0.12
14	1.53	3000000	7.04E+10	788356.01	197089.00	0.20
15	1.54	3000000	7.13E+10	798711.97	199677.99	0.20
16	1.55	3000000	7.20E+10	806523.29	201630.82	0.20
17	1.55	3000000	7.27E+10	814372.62	203593.15	0.20
18	1.55	3000000	7.22E+10	809135.51	202283.88	0.20
19	1.66	3000000	8.35E+10	934799.62	233699.91	0.23
20	1.56	3000000	7.34E+10	822259.96	205564.99	0.21
21	1.58	3000000	7.48E+10	838148.67	209537.17	0.21
22	1.58	3000000	7.53E+10	843478.70	210869.67	0.21
23	1.58	3000000	7.55E+10	846150.05	211537.51	0.21
24	1.59	3000000	7.58E+10	848825.62	212206.40	0.21
25	1.58	3000000	7.53E+10	843478.70	210869.67	0.21
26	1.58	3000000	7.51E+10	840811.57	210202.89	0.21
27	1.58	3000000	7.51E+10	840811.57	210202.89	0.21
28	1.57	3000000	7.41E+10	830185.31	207546.33	0.21
29	1.26	3000000	4.79E+10	536415.15	134103.79	0.13
30	1.60	3000000	7.72E+10	864967.74	216241.94	0.22
Average	1.605		5.30E+10			0.20

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)
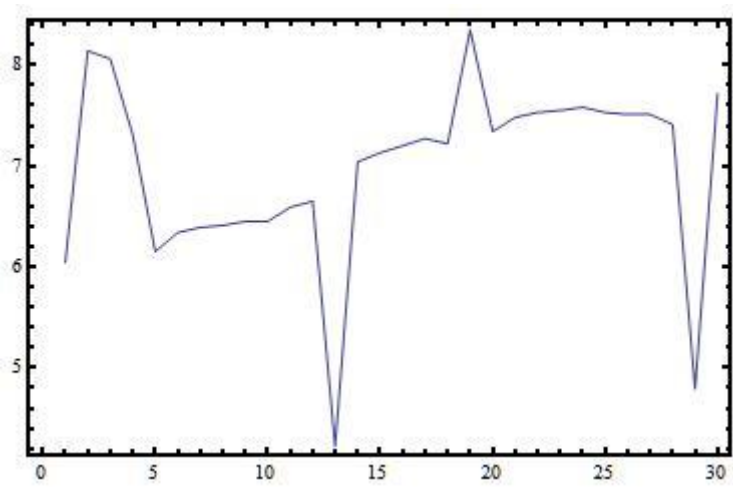
month/year	May-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.60	3000000	7.75E+10	867672.88	216918.22	0.22
2	1.60	3000000	7.70E+10	862266.83	215566.71	0.22
3	1.85	3000000	1.03E+11	1156387.54	289096.88	0.29
4	1.65	3000000	8.16E+10	914306.38	228576.60	0.23
5	1.66	3000000	8.31E+10	931056.68	232764.17	0.23
6	1.67	3000000	8.44E+10	945131.41	236282.85	0.24
7	1.69	3000000	8.59E+10	962160.47	240540.12	0.24
8	1.70	3000000	8.72E+10	976467.49	244116.87	0.24
9	1.71	3000000	8.79E+10	985102.39	246275.60	0.25
10	1.71	3000000	8.85E+10	990880.10	247720.02	0.25
11	1.72	3000000	8.87E+10	993775.29	248443.82	0.25
12	1.47	3000000	6.52E+10	730120.62	182530.16	0.18
13	1.74	3000000	9.11E+10	1020022.08	255005.52	0.26
14	1.74	3000000	9.16E+10	1025901.16	256475.29	0.26
15	1.74	3000000	9.13E+10	1022959.51	255739.88	0.26
16	1.74	3000000	9.08E+10	1017088.88	254272.22	0.25
17	1.73	3000000	9.03E+10	1011235.14	252808.78	0.25
18	1.72	3000000	8.95E+10	1002486.21	250621.55	0.25
19	1.97	3000000	1.17E+11	1311270.82	327817.71	0.33
20	1.77	3000000	9.45E+10	1058538.06	264634.52	0.26
21	1.78	3000000	9.56E+10	1070532.73	267633.18	0.27
22	1.78	3000000	9.58E+10	1073541.96	268385.49	0.27
23	1.78	3000000	9.56E+10	1070532.73	267633.18	0.27
24	1.77	3000000	9.48E+10	1061530.39	265382.60	0.27
25	1.77	3000000	9.42E+10	1055549.95	263887.49	0.26
26	1.75	3000000	9.26E+10	1037709.99	259427.50	0.26
27	1.45	3000000	6.34E+10	710388.55	177597.14	0.18
28	1.77	3000000	9.45E+10	1058538.06	264634.52	0.26
29	1.78	3000000	9.50E+10	1064526.95	266131.74	0.27
30	1.78	3000000	9.53E+10	1067527.73	266881.93	0.27
31	1.78	3000000	9.58E+10	1073541.96	268385.49	0.27
Average	1.72		6.98E+10			0.25

Hiron Point

May

2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)
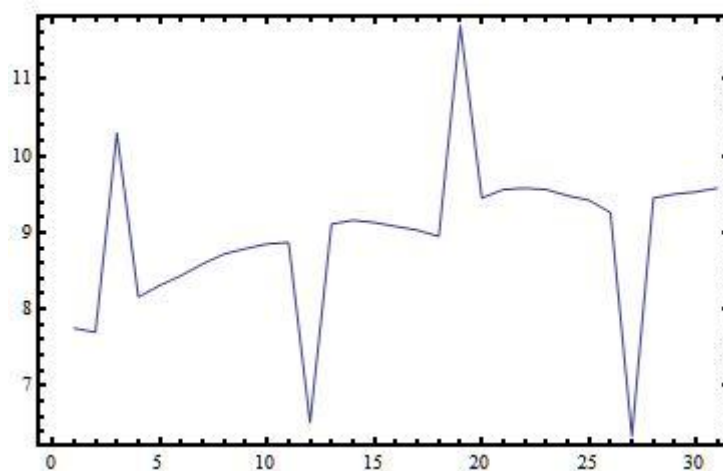
month/year	June-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.05	3000000	1.26E+11	1415318.48	353829.62	0.35
2	1.81	3000000	9.86E+10	1103866.51	275966.63	0.28
3	1.83	3000000	1.01E+11	1131519.72	282879.93	0.28
4	1.85	3000000	1.04E+11	1159515.02	289878.76	0.29
5	1.87	3000000	1.05E+11	1175215.79	293803.95	0.29
6	1.88	3000000	1.06E+11	1187852.43	296963.11	0.30
7	1.88	3000000	1.07E+11	1194196.09	298549.02	0.30
8	1.89	3000000	1.07E+11	1200556.64	300139.16	0.30
9	1.88	3000000	1.07E+11	1197374.25	299343.56	0.30
10	1.88	3000000	1.06E+11	1191022.15	297755.54	0.30
11	1.63	3000000	8.05E+10	901383.48	225345.87	0.23
12	1.87	3000000	1.06E+11	1184686.93	296171.73	0.30
13	1.87	3000000	1.05E+11	1178368.62	294592.15	0.29
14	1.86	3000000	1.04E+11	1165782.66	291445.66	0.29
15	1.85	3000000	1.04E+11	1159515.02	289878.76	0.29
16	1.85	3000000	1.03E+11	1156387.54	289096.88	0.29
17	1.86	3000000	1.04E+11	1162646.73	290661.68	0.29
18	2.13	3000000	1.37E+11	1532918.81	383229.70	0.38
19	1.89	3000000	1.08E+11	1206934.09	301733.52	0.30
20	1.90	3000000	1.09E+11	1216531.94	304132.98	0.30
21	1.90	3000000	1.09E+11	1219739.67	304934.92	0.30
22	1.89	3000000	1.08E+11	1206934.09	301733.52	0.30
23	1.88	3000000	1.07E+11	1197374.25	299343.56	0.30
24	1.87	3000000	1.05E+11	1181525.66	295381.42	0.30
25	1.54	3000000	7.12E+10	797846.40	199461.60	0.20
26	1.87	3000000	1.06E+11	1184686.93	296171.73	0.30
27	1.88	3000000	1.06E+11	1191022.15	297755.54	0.30
28	1.89	3000000	1.07E+11	1203743.25	300935.81	0.30
29	1.90	3000000	1.08E+11	1213328.43	303332.11	0.30
30	1.91	3000000	1.10E+11	1229388.20	307347.05	0.31
Average	1.87		8.97E+10			0.30

Hiron Point

Jun

2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)
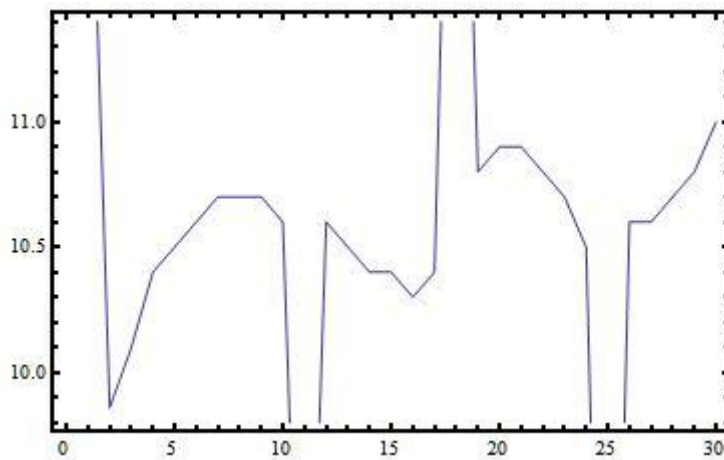
month/year	july-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.14	3000000	1.38E+11	1542529.56	385632.39	0.39
2	1.92	3000000	1.11E+11	1248799.29	312199.82	0.31
3	1.95	3000000	1.14E+11	1281488.99	320372.25	0.32
4	1.96	3000000	1.16E+11	1297992.22	324498.05	0.32
5	1.97	3000000	1.16E+11	1304623.07	326155.77	0.33
6	1.97	3000000	1.17E+11	1307944.84	326986.21	0.33
7	2.04	3000000	1.26E+11	1406113.19	351528.30	0.35
8	1.96	3000000	1.16E+11	1297992.22	324498.05	0.32
9	2.27	3000000	1.55E+11	1741051.67	435262.92	0.44
10	1.66	3000000	8.35E+10	934799.62	233699.91	0.23
11	1.93	3000000	1.12E+11	1255303.44	313825.86	0.31
12	1.92	3000000	1.11E+11	1245553.55	311388.39	0.31
13	1.92	3000000	1.11E+11	1239074.74	309768.68	0.31
14	1.91	3000000	1.10E+11	1235841.67	308960.42	0.31
15	1.91	3000000	1.10E+11	1235841.67	308960.42	0.31
16	1.92	3000000	1.11E+11	1239074.74	309768.68	0.31
17	1.92	3000000	1.11E+11	1239074.74	309768.68	0.31
18	2.18	3000000	1.43E+11	1605731.52	401432.88	0.40
19	1.95	3000000	1.14E+11	1278201.01	319550.25	0.32
20	1.95	3000000	1.14E+11	1281488.99	320372.25	0.32
21	1.94	3000000	1.14E+11	1274917.26	318729.32	0.32
22	1.93	3000000	1.13E+11	1261824.49	315456.12	0.32
23	1.93	3000000	1.12E+11	1252049.25	313012.31	0.31
24	1.54	3000000	7.19E+10	804784.16	201196.04	0.20
25	1.92	3000000	1.11E+11	1248799.29	312199.82	0.31
26	1.93	3000000	1.13E+11	1261824.49	315456.12	0.32
27	1.94	3000000	1.13E+11	1268362.43	317090.61	0.32
28	1.95	3000000	1.14E+11	1278201.01	319550.25	0.32
29	1.96	3000000	1.15E+11	1291378.26	322844.56	0.32
30	1.96	3000000	1.16E+11	1297992.22	324498.05	0.32
31	2.13	3000000	1.36E+11	1528124.69	382031.17	0.38
Average	1.95		1.15E+11			0.32

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

Hiron Point

July

2009
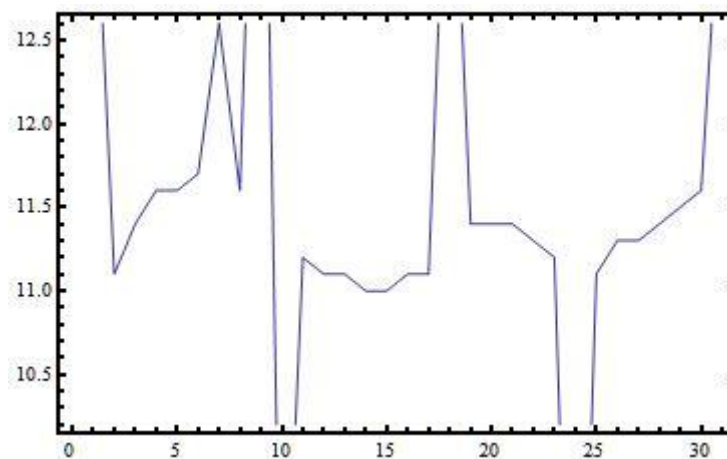
month/year	Aug-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.98	3000000	1.18E+11	1321274.13	330318.53	0.33
2	2.00	3000000	1.20E+11	1348135.43	337033.86	0.34
3	2.00	3000000	1.21E+11	1351512.10	337878.02	0.34
4	2.00	3000000	1.20E+11	1344762.98	336190.75	0.34
5	1.99	3000000	1.19E+11	1338030.76	334507.69	0.33
6	1.99	3000000	1.19E+11	1331315.44	332828.86	0.33
7	1.98	3000000	1.18E+11	1321274.13	330318.53	0.33
8	1.96	3000000	1.16E+11	1297992.22	324498.05	0.32
9	1.61	3000000	7.79E+10	872190.82	218047.71	0.22
10	1.94	3000000	1.14E+11	1274917.26	318729.32	0.32
11	1.94	3000000	1.14E+11	1271637.73	317909.43	0.32
12	1.94	3000000	1.13E+11	1268362.43	317090.61	0.32
13	1.94	3000000	1.14E+11	1274917.26	318729.32	0.32
14	1.95	3000000	1.14E+11	1278201.01	319550.25	0.32
15	1.94	3000000	1.13E+11	1268362.43	317090.61	0.32
16	2.16	3000000	1.40E+11	1571542.02	392885.51	0.39
17	1.96	3000000	1.16E+11	1301305.53	325326.38	0.33
18	1.97	3000000	1.17E+11	1311270.82	327817.71	0.33
19	1.97	3000000	1.16E+11	1304623.07	326155.77	0.33
20	1.96	3000000	1.16E+11	1301305.53	325326.38	0.33
21	1.91	3000000	1.09E+11	1226167.80	306541.95	0.31
22	1.95	3000000	1.14E+11	1281488.99	320372.25	0.32
23	1.53	3000000	7.09E+10	794388.78	198597.19	0.20
24	1.97	3000000	1.16E+11	1304623.07	326155.77	0.33
25	1.97	3000000	1.17E+11	1307944.84	326986.21	0.33
26	1.98	3000000	1.18E+11	1317935.47	329483.87	0.33
27	1.98	3000000	1.18E+11	1324617.01	331154.25	0.33
28	1.98	3000000	1.19E+11	1327964.11	331991.03	0.33
29	1.98	3000000	1.18E+11	1317935.47	329483.87	0.33
30	2.12	3000000	1.36E+11	1523338.09	380834.52	0.38
31	2.01	3000000	1.22E+11	1365061.01	341265.25	0.34
Average	1.95		1.15E+11			0.32

Hiron Point

August

2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

month/year	Sep-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.01	3000000	1.22E+11	1368458.79	342114.70	0.34
2	2.01	3000000	1.21E+11	1358278.10	339569.53	0.34
3	2.00	3000000	1.20E+11	1348135.43	337033.86	0.34
4	1.99	3000000	1.20E+11	1341394.76	335348.69	0.34
5	1.99	3000000	1.19E+11	1331315.44	332828.86	0.33
6	1.97	3000000	1.17E+11	1314601.03	328650.26	0.33
7	1.96	3000000	1.16E+11	1294683.12	323670.78	0.32
8	1.57	3000000	7.44E+10	832835.54	208208.89	0.21
9	1.96	3000000	1.15E+11	1291378.26	322844.56	0.32
10	1.96	3000000	1.16E+11	1294683.12	323670.78	0.32
11	1.96	3000000	1.16E+11	1297992.22	324498.05	0.32
12	1.96	3000000	1.16E+11	1301305.53	325326.38	0.33
13	1.94	3000000	1.14E+11	1274917.26	318729.32	0.32
14	2.14	3000000	1.39E+11	1552170.35	388042.59	0.39
15	1.97	3000000	1.17E+11	1314601.03	328650.26	0.33
16	1.98	3000000	1.18E+11	1324617.01	331154.25	0.33
17	1.98	3000000	1.18E+11	1321274.13	330318.53	0.33
18	1.97	3000000	1.17E+11	1314601.03	328650.26	0.33
19	1.97	3000000	1.17E+11	1307944.84	326986.21	0.33
20	1.96	3000000	1.16E+11	1301305.53	325326.38	0.33
21	1.96	3000000	1.15E+11	1291378.26	322844.56	0.32
22	1.56	3000000	7.37E+10	825777.65	206444.41	0.21
23	1.99	3000000	1.19E+11	1331315.44	332828.86	0.33
24	1.99	3000000	1.19E+11	1338030.76	334507.69	0.33
25	2.00	3000000	1.20E+11	1344762.98	336190.75	0.34
26	2.00	3000000	1.20E+11	1344762.98	336190.75	0.34
27	1.98	3000000	1.18E+11	1321274.13	330318.53	0.33
28	2.08	3000000	1.31E+11	1466484.48	366621.12	0.37
29	2.00	3000000	1.20E+11	1344762.98	336190.75	0.34
30	2.00	3000000	1.20E+11	1348135.43	337033.86	0.34
Average	1.96		1.16E+11			0.33

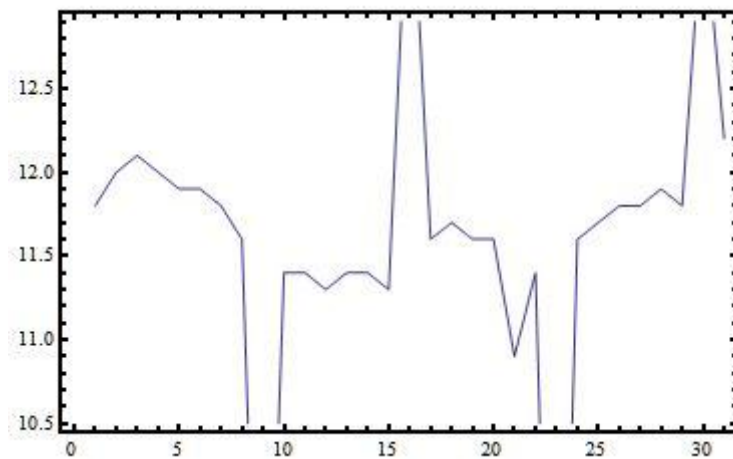
Hiron Point September 2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

month/year	Oct-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.99	3000000	1.19E+11	1338030.76	334507.69	0.33
2	1.99	3000000	1.19E+11	1334670.99	333667.75	0.33
3	1.98	3000000	1.18E+11	1324617.01	331154.25	0.33
4	1.97	3000000	1.17E+11	1307944.84	326986.21	0.33
5	1.95	3000000	1.15E+11	1288077.61	322019.40	0.32
6	1.94	3000000	1.14E+11	1274917.26	318729.32	0.32
7	1.93	3000000	1.12E+11	1252049.25	313012.31	0.31
8	1.55	3000000	7.25E+10	811751.95	202937.99	0.20
9	1.94	3000000	1.13E+11	1268362.43	317090.61	0.32
10	1.94	3000000	1.14E+11	1271637.73	317909.43	0.32
11	1.93	3000000	1.13E+11	1261824.49	315456.12	0.32
12	1.91	3000000	1.10E+11	1232612.82	308153.21	0.31
13	2.11	3000000	1.34E+11	1504266.75	376066.69	0.38
14	1.94	3000000	1.14E+11	1274917.26	318729.32	0.32
15	1.95	3000000	1.14E+11	1278201.01	319550.25	0.32
16	1.95	3000000	1.14E+11	1278201.01	319550.25	0.32
17	1.94	3000000	1.14E+11	1274917.26	318729.32	0.32
18	1.94	3000000	1.13E+11	1268362.43	317090.61	0.32
19	1.94	3000000	1.13E+11	1265091.35	316272.84	0.32
20	1.93	3000000	1.12E+11	1252049.25	313012.31	0.31
21	1.54	3000000	7.15E+10	801311.52	200327.88	0.20
22	1.95	3000000	1.14E+11	1278201.01	319550.25	0.32
23	1.94	3000000	1.14E+11	1274917.26	318729.32	0.32
24	1.94	3000000	1.14E+11	1274917.26	318729.32	0.32
25	1.94	3000000	1.13E+11	1268362.43	317090.61	0.32
26	1.93	3000000	1.12E+11	1255303.44	313825.86	0.31
27	1.91	3000000	1.10E+11	1232612.82	308153.21	0.31
28	2.04	3000000	1.25E+11	1401521.80	350380.45	0.35
29	1.93	3000000	1.12E+11	1255303.44	313825.86	0.31
30	1.93	3000000	1.12E+11	1252049.25	313012.31	0.31
31	1.91	3000000	1.10E+11	1235841.67	308960.42	0.31
Average	1.92		1.12E+11			0.31

Hiron Point

October

2009

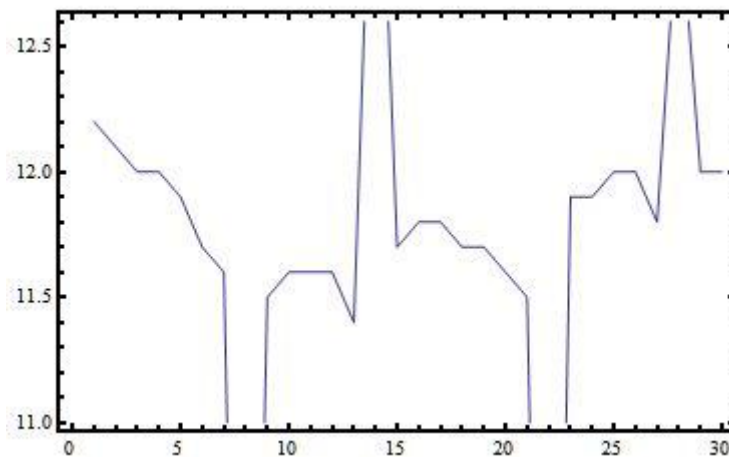Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)
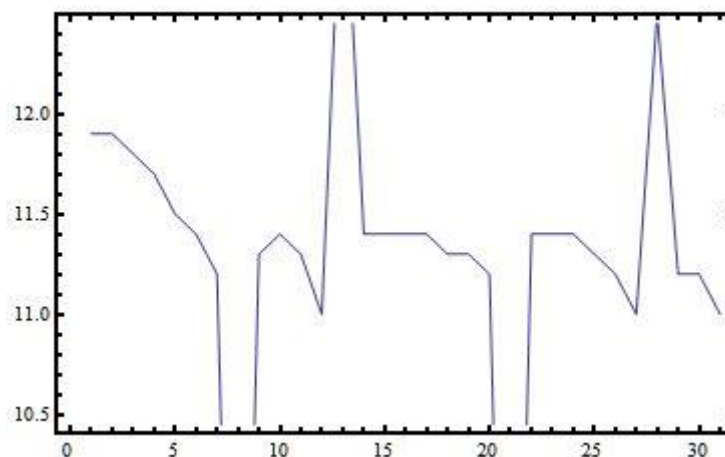
month/year	Nov-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.90	3000000	1.09E+11	1219739.67	304934.92	0.30
2	1.88	3000000	1.07E+11	1194196.09	298549.02	0.30
3	1.87	3000000	1.05E+11	1175215.79	293803.95	0.29
4	1.85	3000000	1.03E+11	1153264.28	288316.07	0.29
5	1.83	3000000	1.01E+11	1134613.41	283653.35	0.28
6	1.45	3000000	6.34E+10	710388.55	177597.14	0.18
7	1.84	3000000	1.02E+11	1140813.47	285203.37	0.29
8	1.83	3000000	1.01E+11	1134613.41	283653.35	0.28
9	1.82	3000000	1.00E+11	1122263.97	280565.99	0.28
10	1.81	3000000	9.91E+10	1109982.10	277495.53	0.28
11	2.00	3000000	1.20E+11	1347010.81	336752.70	0.34
12	1.83	3000000	1.01E+11	1131519.72	282879.93	0.28
13	1.84	3000000	1.02E+11	1137711.33	284427.83	0.28
14	1.83	3000000	1.01E+11	1134613.41	283653.35	0.28
15	1.83	3000000	1.01E+11	1128430.24	282107.56	0.28
16	1.82	3000000	1.00E+11	1122263.97	280565.99	0.28
17	1.82	3000000	9.94E+10	1113046.23	278261.56	0.28
18	1.81	3000000	9.83E+10	1100815.05	275203.76	0.28
19	1.80	3000000	9.72E+10	1088651.44	272162.86	0.27
20	1.46	3000000	6.40E+10	716935.87	179233.97	0.18
21	1.81	3000000	9.83E+10	1100815.05	275203.76	0.28
22	1.80	3000000	9.75E+10	1091686.01	272921.50	0.27
23	1.79	3000000	9.61E+10	1076555.41	269138.85	0.27
24	1.78	3000000	9.53E+10	1067527.73	266881.93	0.27
25	1.77	3000000	9.40E+10	1052566.07	263141.52	0.26
26	1.75	3000000	9.24E+10	1034751.45	258687.86	0.26
27	1.88	3000000	1.07E+11	1198434.58	299608.65	0.30
28	1.76	3000000	9.34E+10	1046610.97	261652.74	0.26
29	1.75	3000000	9.21E+10	1031797.13	257949.28	0.26
30	1.73	3000000	9.03E+10	1011235.14	252808.78	0.25
Average	1.80		9.77E+10			0.27

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

Hiron Point
November
2009
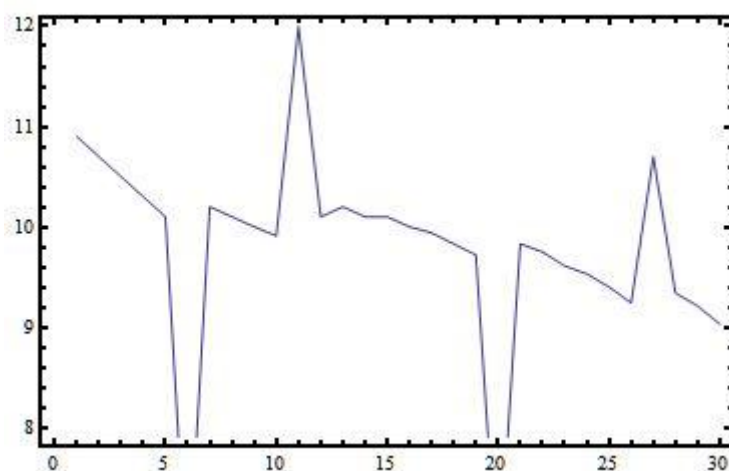
month/year	Dec-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.71	3000000	8.79E+10	985102.39	246275.60	0.25
2	1.68	3000000	8.54E+10	956467.22	239116.81	0.24
3	1.67	3000000	8.36E+10	936673.91	234168.48	0.23
4	1.24	3000000	4.64E+10	519521.25	129880.31	0.13
5	1.65	3000000	8.16E+10	914306.38	228576.60	0.23
6	1.64	3000000	8.11E+10	908756.73	227189.18	0.23
7	1.64	3000000	8.11E+10	908756.73	227189.18	0.23
8	1.64	3000000	8.14E+10	911529.45	227882.36	0.23
9	1.64	3000000	8.09E+10	905988.25	226497.06	0.23
10	1.80	3000000	9.77E+10	1094724.80	273681.20	0.27
11	1.64	3000000	8.06E+10	903223.98	225806.00	0.23
12	1.65	3000000	8.16E+10	914306.38	228576.60	0.23
13	1.65	3000000	8.16E+10	914306.38	228576.60	0.23
14	1.64	3000000	8.09E+10	905988.25	226497.06	0.23
15	1.63	3000000	7.99E+10	894956.53	223739.13	0.22
16	1.62	3000000	7.89E+10	883992.39	220998.10	0.22
17	1.61	3000000	7.82E+10	875813.63	218953.41	0.22
18	1.60	3000000	7.70E+10	862266.83	215566.71	0.22
19	1.24	3000000	4.61E+10	516731.88	129182.97	0.13
20	1.58	3000000	7.55E+10	846150.05	211537.51	0.21
21	1.57	3000000	7.46E+10	835490.00	208872.50	0.21
22	1.56	3000000	7.32E+10	819626.62	204906.66	0.20
23	1.55	3000000	7.22E+10	809135.51	202283.88	0.20
24	1.54	3000000	7.11E+10	796116.65	199029.16	0.20
25	1.53	3000000	7.04E+10	788356.01	197089.00	0.20
26	1.52	3000000	6.92E+10	775506.09	193876.52	0.19
27	1.63	3000000	8.01E+10	897708.12	224427.03	0.22
28	1.52	3000000	6.97E+10	780633.39	195158.35	0.20
29	1.51	3000000	6.86E+10	767846.82	191961.70	0.19
30	1.49	3000000	6.67E+10	747607.92	186901.98	0.19
31	1.47	3000000	6.50E+10	727639.33	181909.83	0.18
Average	1.58		7.58E+10			0.21

Hiron Point

December

2009

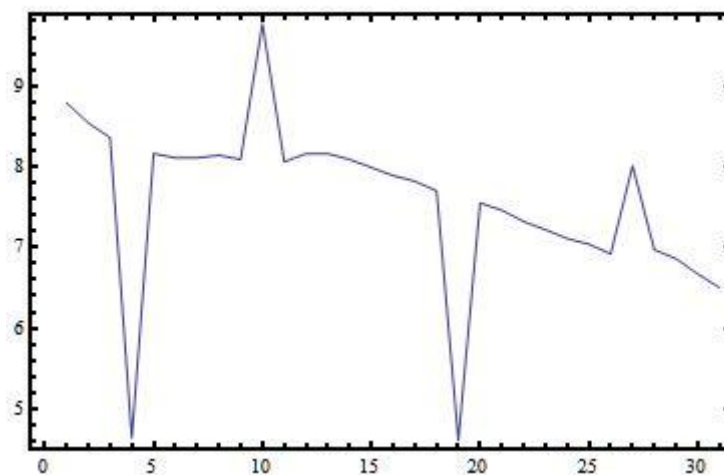Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

BIII: Calculation for Hiron Point during Year 2005

month/year	Jan-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.47	3000000	6.50E+10	727639.33	181909.83	0.18
2	1.46	3000000	6.41E+10	717756.40	179439.10	0.18
3	1.45	3000000	6.34E+10	710388.55	177597.14	0.18
4	1.45	3000000	6.30E+10	705497.76	176374.44	0.18
5	1.58	3000000	7.53E+10	843478.70	210869.67	0.21
6	1.44	3000000	6.28E+10	703058.70	175764.68	0.18
7	1.44	3000000	6.28E+10	703058.70	175764.68	0.18
8	1.43	3000000	6.17E+10	690926.77	172731.69	0.17
9	1.41	3000000	6.02E+10	674119.45	168529.86	0.17
10	1.40	3000000	5.87E+10	657519.08	164379.77	0.16
11	1.38	3000000	5.70E+10	638800.64	159700.16	0.16
12	0.92	3000000	2.55E+10	285979.96	71494.99	0.07
13	1.37	3000000	5.62E+10	629542.78	157385.70	0.16
14	1.37	3000000	5.62E+10	629542.78	157385.70	0.16
15	1.37	3000000	5.66E+10	634163.26	158540.82	0.16
16	1.38	3000000	5.70E+10	638800.64	159700.16	0.16
17	1.38	3000000	5.74E+10	643454.91	160863.73	0.16
18	1.38	3000000	5.77E+10	645788.38	161447.09	0.16
19	1.49	3000000	6.67E+10	746770.50	186692.63	0.19
20	1.39	3000000	5.81E+10	650467.99	162617.00	0.16
21	1.39	3000000	5.85E+10	655164.49	163791.12	0.16
22	1.39	3000000	5.81E+10	650467.99	162617.00	0.16
23	1.37	3000000	5.62E+10	629542.78	157385.70	0.16
24	1.36	3000000	5.58E+10	624939.19	156234.80	0.16
25	1.34	3000000	5.42E+10	606693.78	151673.45	0.15
26	1.33	3000000	5.30E+10	593187.11	148296.78	0.15
27	0.94	3000000	2.67E+10	298549.02	74637.26	0.07
28	1.31	3000000	5.14E+10	575414.72	143853.68	0.14
29	1.30	3000000	5.06E+10	566629.89	141657.47	0.14
30	1.29	3000000	5.02E+10	562262.82	140565.71	0.14
31	1.29	3000000	5.00E+10	560085.62	140021.40	0.14
Average	1.36		5.64E+10			0.16

Hiron Point

January

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

month/year	Feb-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.34	3000000	5.417E+10	606693.78	151673.45	0.15
2	1.30	3000000	5.059E+10	566629.89	141657.47	0.14
3	1.30	3000000	5.078E+10	568819.77	142204.94	0.14
4	1.40	3000000	5.912E+10	662240.93	165560.23	0.17
5	1.30	3000000	5.078E+10	568819.77	142204.94	0.14
6	1.30	3000000	5.059E+10	566629.89	141657.47	0.14
7	1.29	3000000	5.02E+10	562262.82	140565.71	0.14
8	1.27	3000000	4.865E+10	544963.47	136240.87	0.14
9	1.25	3000000	4.713E+10	527934.41	131983.60	0.13
10	0.77	3000000	1.804E+10	202066.08	50516.52	0.05
11	1.25	3000000	4.732E+10	530048.26	132512.07	0.13
12	1.27	3000000	4.827E+10	540680.86	135170.22	0.14
13	1.28	3000000	4.904E+10	549262.96	137315.74	0.14
14	1.28	3000000	4.942E+10	553579.35	138394.84	0.14
15	1.29	3000000	5.02E+10	562262.82	140565.71	0.14
16	1.30	3000000	5.059E+10	566629.89	141657.47	0.14
17	1.37	3000000	5.689E+10	637252.97	159313.24	0.16
18	1.30	3000000	5.098E+10	571013.86	142753.47	0.14
19	1.33	3000000	5.296E+10	593187.11	148296.78	0.15
20	1.32	3000000	5.256E+10	588718.67	147179.67	0.15
21	1.31	3000000	5.197E+10	582047.69	145511.92	0.15
22	1.30	3000000	5.078E+10	568819.77	142204.94	0.14
23	1.28	3000000	4.942E+10	553579.35	138394.84	0.14
24	1.27	3000000	4.865E+10	544963.47	136240.87	0.14
25	1.26	3000000	4.77E+10	534288.63	133572.16	0.13
26	0.86	3000000	2.214E+10	247961.17	61990.29	0.06
27	1.26	3000000	4.77E+10	534288.63	133572.16	0.13
28	1.26	3000000	4.789E+10	536415.15	134103.79	0.13
Average	1.26		4.84E+10			0.14

Hiron Point

February

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

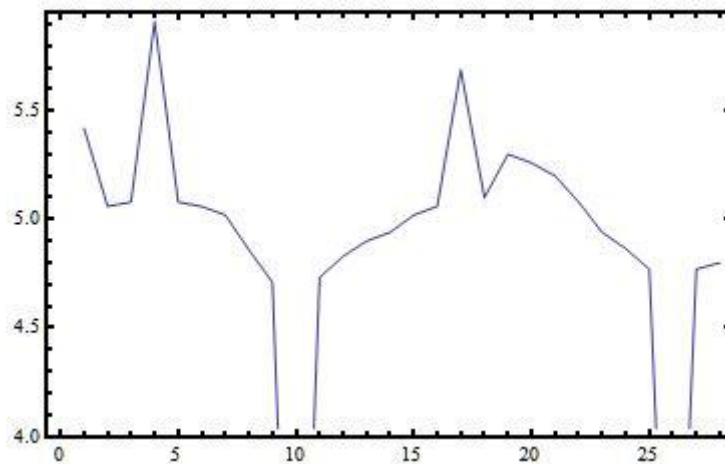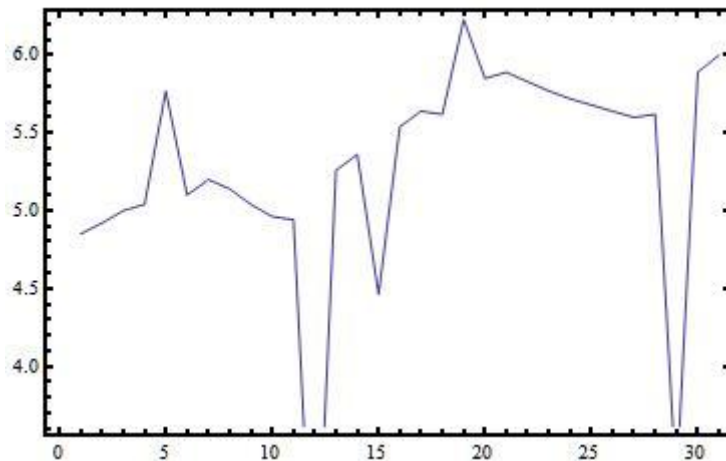| month/year	March-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.27	3000000	48462974198	542820.05	135705.01	0.14
2	1.28	3000000	49230692536	551419.05	137854.76	0.14
3	1.29	3000000	50004444023	560085.62	140021.40	0.14
4	1.29	3000000	50393582198	564444.25	141111.06	0.14
5	1.38	3000000	57725514375	646567.14	161641.79	0.16
6	1.30	3000000	50980117500	571013.86	142753.47	0.14
7	1.31	3000000	51965217773	582047.69	145511.92	0.15
8	1.31	3000000	51373026394	575414.72	143853.68	0.14
9	1.29	3000000	50393582198	564444.25	141111.06	0.14
10	1.28	3000000	49616814136	555743.89	138935.97	0.14
11	1.28	3000000	49423564800	553579.35	138394.84	0.14
12	0.86	3000000	22137973575	247961.17	61990.29	0.06
13	1.32	3000000	52560802800	588718.67	147179.67	0.15
14	1.33	3000000	53560985948	599921.44	149980.36	0.15
15	1.35	3000000	54570595894	611229.79	152807.45	0.15
16	1.36	3000000	55385071144	620352.50	155088.12	0.16
17	1.37	3000000	56411649323	631850.91	157962.73	0.16
18	1.37	3000000	56205579544	629542.78	157385.70	0.16
19	1.44	3000000	62262443175	697384.00	174346.00	0.17
20	1.39	3000000	58493086073	655164.49	163791.12	0.16
21	1.40	3000000	58913898286	659877.89	164969.47	0.16
22	1.39	3000000	58283245575	652814.13	163203.53	0.16
23	1.38	3000000	57655986511	645788.38	161447.09	0.16
24	1.38	3000000	57239699161	641125.66	160281.42	0.16
25	1.37	3000000	56824920098	636479.84	159119.96	0.16
26	1.37	3000000	56411649323	631850.91	157962.73	0.16
27	1.36	3000000	55999886836	627238.88	156809.72	0.16
28	1.37	3000000	56205579544	629542.78	157385.70	0.16
29	1.03	3000000	32210317500	360778.65	90194.66	0.09
30	1.40	3000000	58913898286	659877.89	164969.47	0.16
31	1.41	3000000	59972527575	671735.30	167933.82	0.17
Average	1.32		5.29E+10			0.15

Hiron Point

March

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

month/year	Apr-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.42	3000000	61040583661	683698.29	170924.57	0.17
2	1.41	3000000	60185384648	674119.45	168529.86	0.17
3	1.55	3000000	72161836800	808264.30	202066.08	0.20
4	1.44	3000000	62769081136	703058.70	175764.68	0.18
5	1.45	3000000	63642379598	712840.27	178210.07	0.18
6	1.45	3000000	63642379598	712840.27	178210.07	0.18
7	1.45	3000000	63423489375	710388.55	177597.14	0.18
8	1.45	3000000	63642379598	712840.27	178210.07	0.18
9	1.47	3000000	64742486794	725162.26	181290.57	0.18
10	1.47	3000000	65185169175	730120.62	182530.16	0.18
11	1.13	3000000	38746230000	433985.55	108496.39	0.11
12	1.52	3000000	69465877636	778067.63	194516.91	0.19
13	1.53	3000000	70384424723	788356.01	197089.00	0.20
14	1.54	3000000	71309004961	798711.97	199677.99	0.20
15	1.55	3000000	72473214375	811751.95	202937.99	0.20
16	1.55	3000000	72473214375	811751.95	202937.99	0.20
17	1.64	3000000	80804324175	905066.36	226266.59	0.23
18	1.56	3000000	73176264886	819626.62	204906.66	0.20
19	1.57	3000000	74355557175	832835.54	208208.89	0.21
20	1.58	3000000	74829913594	838148.67	209537.17	0.21
21	1.58	3000000	75067657411	840811.57	210202.89	0.21
22	1.58	3000000	74829913594	838148.67	209537.17	0.21
23	1.57	3000000	74592546848	835490.00	208872.50	0.21
24	1.57	3000000	74592546848	835490.00	208872.50	0.21
25	1.57	3000000	74592546848	835490.00	208872.50	0.21
26	1.57	3000000	74355557175	832835.54	208208.89	0.21
27	1.26	3000000	47638087575	533580.73	133395.18	0.13
28	1.60	3000000	76983182536	862266.83	215566.71	0.22
29	1.61	3000000	77707726144	870382.24	217595.56	0.22
30	1.61	3000000	78435663398	878535.66	219633.91	0.22
Average	1.51		6.89E+10			0.19

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

Hiron Point

April

2005

month/year	May-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.60	3000000	76742422144	859570.14	214892.54	0.21
2	1.81	3000000	98462348700	1102848.89	275712.22	0.28
3	1.63	3000000	80393420573	900463.94	225115.99	0.23
4	1.65	3000000	82375310348	922662.53	230665.63	0.23
5	1.66	3000000	83124740700	931056.68	232764.17	0.23
6	1.67	3000000	83877564698	939488.85	234872.21	0.23
7	1.68	3000000	85393393636	956467.22	239116.81	0.24
8	1.69	3000000	86411487698	967870.61	241967.65	0.24
9	1.70	3000000	87179017500	976467.49	244116.87	0.24
10	1.70	3000000	87435614911	979341.56	244835.39	0.24
11	1.45	3000000	63132222300	707126.15	176781.54	0.18
12	1.24	3000000	46196018086	517428.52	129357.13	0.13
13	1.74	3000000	91592455261	1025901.16	256475.29	0.26
14	1.74	3000000	91592455261	1025901.16	256475.29	0.26
15	1.74	3000000	91329824700	1022959.51	255739.88	0.26
16	1.73	3000000	90022327973	1008314.61	252078.65	0.25
17	1.90	3000000	1.09281E+11	1224023.21	306005.80	0.31
18	1.76	3000000	92911264144	1040672.76	260168.19	0.26
19	1.77	3000000	94773433598	1061530.39	265382.60	0.27
20	1.78	3000000	95040966094	1064526.95	266131.74	0.27
21	1.78	3000000	95577162300	1070532.73	267633.18	0.27
22	1.78	3000000	95308875661	1067527.73	266881.93	0.27
23	1.77	3000000	94773433598	1061530.39	265382.60	0.27
24	1.77	3000000	94239499823	1055549.95	263887.49	0.26
25	1.76	3000000	93176157136	1043639.75	260909.94	0.26
26	1.46	3000000	64301312700	720220.80	180055.20	0.18
27	1.77	3000000	94506278175	1058538.06	264634.52	0.26
28	1.77	3000000	94506278175	1058538.06	264634.52	0.26
29	1.78	3000000	95040966094	1064526.95	266131.74	0.27
30	1.77	3000000	94506278175	1058538.06	264634.52	0.26
31	1.78	3000000	95040966094	1064526.95	266131.74	0.27
Average	1.70		8.80E+10			0.25

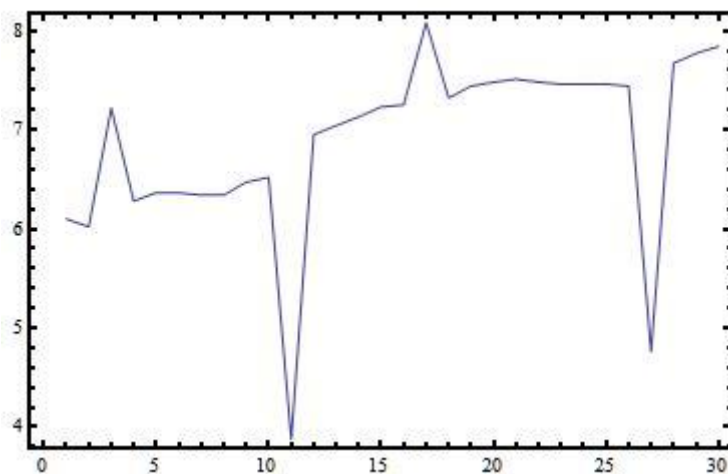
Hiron Point

May

2005

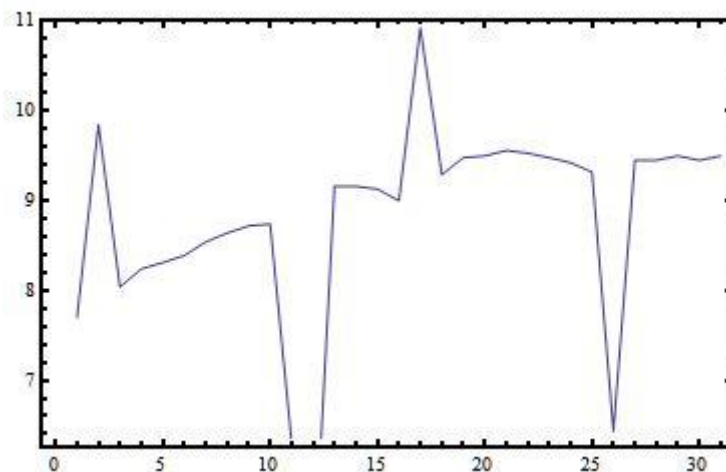Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

month/year				Jun-05		
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.06	3000000	1.28426E+11	1438463.13	359615.78	0.36
2	1.82	3000000	99921030300	1119187.17	279796.79	0.28
3	1.84	3000000	1.01575E+11	1137711.33	284427.83	0.28
4	1.85	3000000	1.03242E+11	1156387.54	289096.88	0.29
5	1.86	3000000	1.04642E+11	1172067.19	293016.80	0.29
6	1.87	3000000	1.05487E+11	1181525.66	295381.42	0.30
7	1.88	3000000	1.06334E+11	1191022.15	297755.54	0.30
8	1.87	3000000	1.05769E+11	1184686.93	296171.73	0.30
9	1.88	3000000	1.06051E+11	1187852.43	296963.11	0.30
10	1.65	3000000	81794766300	916160.02	229040.00	0.23
11	1.88	3000000	1.06618E+11	1194196.09	298549.02	0.30
12	1.87	3000000	1.05769E+11	1184686.93	296171.73	0.30
13	1.87	3000000	1.05205E+11	1178368.62	294592.15	0.29
14	1.86	3000000	1.04081E+11	1165782.66	291445.66	0.29
15	1.85	3000000	1.03522E+11	1159515.02	289878.76	0.29
16	1.86	3000000	1.03801E+11	1162646.73	290661.68	0.29
17	2.12	3000000	1.35151E+11	1513787.40	378446.85	0.38
18	1.89	3000000	1.0804E+11	1210129.15	302532.29	0.30
19	1.90	3000000	1.08898E+11	1219739.67	304934.92	0.30
20	1.90	3000000	1.08898E+11	1219739.67	304934.92	0.30
21	1.90	3000000	1.08326E+11	1213328.43	303332.11	0.30
22	1.89	3000000	1.0747E+11	1203743.25	300935.81	0.30
23	1.88	3000000	1.06051E+11	1187852.43	296963.11	0.30
24	1.56	3000000	73725428175	825777.65	206444.41	0.21
25	1.87	3000000	1.05487E+11	1181525.66	295381.42	0.30
26	1.87	3000000	1.05769E+11	1184686.93	296171.73	0.30
27	1.88	3000000	1.06334E+11	1191022.15	297755.54	0.30
28	1.88	3000000	1.06902E+11	1197374.25	299343.56	0.30
29	1.89	3000000	1.07755E+11	1206934.09	301733.52	0.30
30	2.15	3000000	1.39441E+11	1561841.17	390460.29	0.39
Average	1.88		1.07E+11			0.30

Hiron Point

Jun

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

115
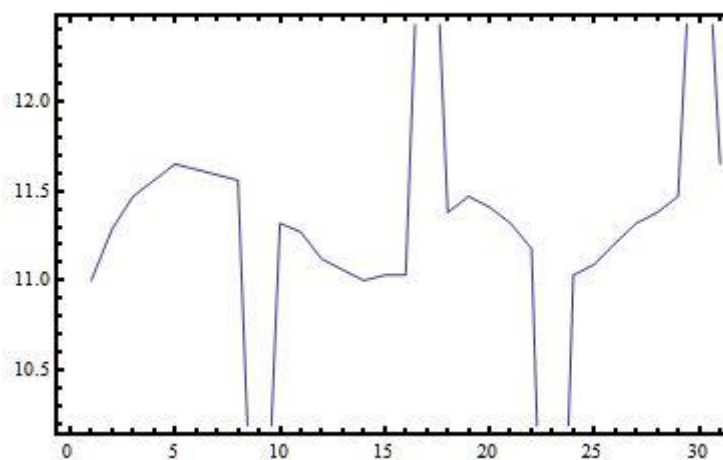
month/year	july-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.91	3000000	1.10048E+11	1232612.82	308153.21	0.31
2	1.94	3000000	1.12947E+11	1265091.35	316272.84	0.32
3	1.95	3000000	1.14705E+11	1284781.19	321195.30	0.32
4	1.96	3000000	1.15589E+11	1294683.12	323670.78	0.32
5	1.97	3000000	1.16477E+11	1304623.07	326155.77	0.33
6	1.96	3000000	1.16181E+11	1301305.53	325326.38	0.33
7	1.96	3000000	1.15885E+11	1297992.22	324498.05	0.32
8	1.96	3000000	1.15589E+11	1294683.12	323670.78	0.32
9	1.69	3000000	86156398575	965013.42	241253.36	0.24
10	1.94	3000000	1.13239E+11	1268362.43	317090.61	0.32
11	1.93	3000000	1.12656E+11	1261824.49	315456.12	0.32
12	1.92	3000000	1.11203E+11	1245553.55	311388.39	0.31
13	1.92	3000000	1.10625E+11	1239074.74	309768.68	0.31
14	1.91	3000000	1.10048E+11	1232612.82	308153.21	0.31
15	1.91	3000000	1.10336E+11	1235841.67	308960.42	0.31
16	1.91	3000000	1.10336E+11	1235841.67	308960.42	0.31
17	2.17	3000000	1.41611E+11	1586149.61	396537.40	0.40
18	1.94	3000000	1.13825E+11	1274917.26	318729.32	0.32
19	1.95	3000000	1.14705E+11	1284781.19	321195.30	0.32
20	1.95	3000000	1.14118E+11	1278201.01	319550.25	0.32
21	1.94	3000000	1.13239E+11	1268362.43	317090.61	0.32
22	1.93	3000000	1.11783E+11	1252049.25	313012.31	0.31
23	1.57	3000000	74355557175	832835.54	208208.89	0.21
24	1.91	3000000	1.10336E+11	1235841.67	308960.42	0.31
25	1.92	3000000	1.10914E+11	1242312.03	310578.01	0.31
26	1.93	3000000	1.12073E+11	1255303.44	313825.86	0.31
27	1.94	3000000	1.13239E+11	1268362.43	317090.61	0.32
28	1.94	3000000	1.13825E+11	1274917.26	318729.32	0.32
29	1.95	3000000	1.14705E+11	1284781.19	321195.30	0.32
30	2.14	3000000	1.38147E+11	1547346.20	386836.55	0.39
31	1.97	3000000	1.16477E+11	1304623.07	326155.77	0.33
Average	1.93		1.13E+11			0.32

Hiron Point

July

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

116
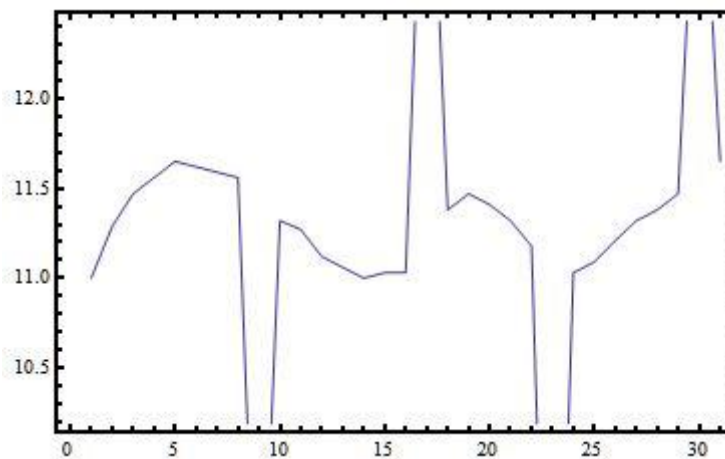
month/year	Aug-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.99	3000000	1.19159E+11	1334670.99	333667.75	0.33
2	2.00	3000000	1.20362E+11	1348135.43	337033.86	0.34
3	2.00	3000000	1.20663E+11	1351512.10	337878.02	0.34
4	1.99	3000000	1.1976E+11	1341394.76	335348.69	0.34
5	1.99	3000000	1.19159E+11	1334670.99	333667.75	0.33
6	1.98	3000000	1.18561E+11	1327964.11	331991.03	0.33
7	2.02	3000000	1.2248E+11	1371860.80	342965.20	0.34
8	1.64	3000000	81133801200	908756.73	227189.18	0.23
9	1.95	3000000	1.14705E+11	1284781.19	321195.30	0.32
10	1.94	3000000	1.13825E+11	1274917.26	318729.32	0.32
11	1.94	3000000	1.13239E+11	1268362.43	317090.61	0.32
12	1.94	3000000	1.13239E+11	1268362.43	317090.61	0.32
13	1.94	3000000	1.13825E+11	1274917.26	318729.32	0.32
14	1.95	3000000	1.14118E+11	1278201.01	319550.25	0.32
15	2.14	3000000	1.38578E+11	1552170.35	388042.59	0.39
16	1.96	3000000	1.15885E+11	1297992.22	324498.05	0.32
17	1.97	3000000	1.16773E+11	1307944.84	326986.21	0.33
18	1.97	3000000	1.1707E+11	1311270.82	327817.71	0.33
19	1.96	3000000	1.15885E+11	1297992.22	324498.05	0.32
20	1.95	3000000	1.15E+11	1288077.61	322019.40	0.32
21	1.95	3000000	1.14118E+11	1278201.01	319550.25	0.32
22	1.53	3000000	70615004175	790938.67	197734.67	0.20
23	1.95	3000000	1.14705E+11	1284781.19	321195.30	0.32
24	1.96	3000000	1.15885E+11	1297992.22	324498.05	0.32
25	1.97	3000000	1.16773E+11	1307944.84	326986.21	0.33
26	1.97	3000000	1.17368E+11	1314601.03	328650.26	0.33
27	1.98	3000000	1.17665E+11	1317935.47	329483.87	0.33
28	1.97	3000000	1.17368E+11	1314601.03	328650.26	0.33
29	2.12	3000000	1.35151E+11	1513787.40	378446.85	0.38
30	2.00	3000000	1.20965E+11	1354892.99	338723.25	0.34
31	2.01	3000000	1.22176E+11	1368458.79	342114.70	0.34
Average	1.96		1.16E+11			0.32

Hiron Point

August

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)
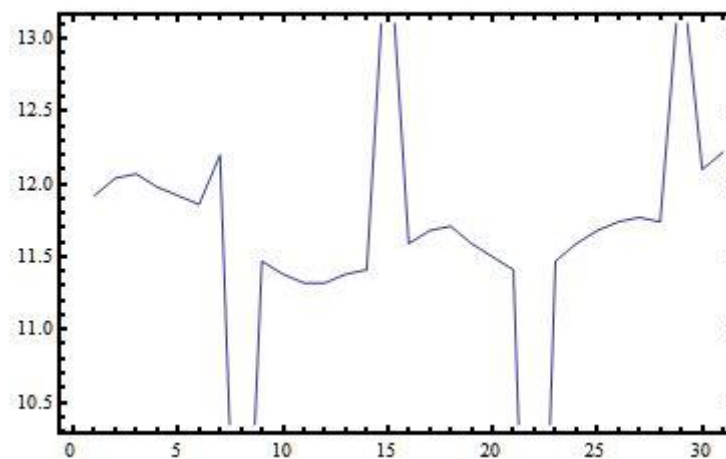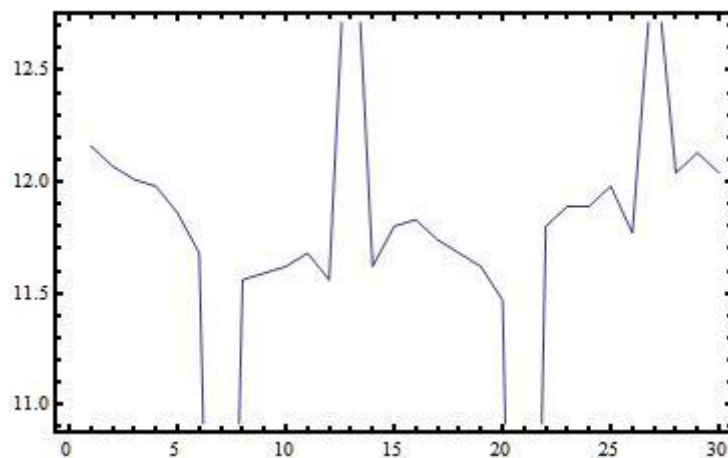
month/year	Sep-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.01	3000000	1.2157E+11	1361667.44	340416.86	0.34
2	2.00	3000000	1.20663E+11	1351512.10	337878.02	0.34
3	2.00	3000000	1.2006E+11	1344762.98	336190.75	0.34
4	1.99	3000000	1.1976E+11	1341394.76	335348.69	0.34
5	1.98	3000000	1.18561E+11	1327964.11	331991.03	0.33
6	1.97	3000000	1.16773E+11	1307944.84	326986.21	0.33
7	1.58	3000000	75623859375	847041.44	211760.36	0.21
8	1.96	3000000	1.15589E+11	1294683.12	323670.78	0.32
9	1.96	3000000	1.15885E+11	1297992.22	324498.05	0.32
10	1.96	3000000	1.16181E+11	1301305.53	325326.38	0.33
11	1.97	3000000	1.16773E+11	1307944.84	326986.21	0.33
12	1.96	3000000	1.15589E+11	1294683.12	323670.78	0.32
13	2.12	3000000	1.35577E+11	1518558.99	379639.75	0.38
14	1.96	3000000	1.16181E+11	1301305.53	325326.38	0.33
15	1.98	3000000	1.17963E+11	1321274.13	330318.53	0.33
16	1.98	3000000	1.18262E+11	1324617.01	331154.25	0.33
17	1.97	3000000	1.17368E+11	1314601.03	328650.26	0.33
18	1.97	3000000	1.16773E+11	1307944.84	326986.21	0.33
19	1.96	3000000	1.16181E+11	1301305.53	325326.38	0.33
20	1.95	3000000	1.14705E+11	1284781.19	321195.30	0.32
21	1.54	3000000	71231726175	797846.40	199461.60	0.20
22	1.98	3000000	1.17963E+11	1321274.13	330318.53	0.33
23	1.99	3000000	1.1886E+11	1331315.44	332828.86	0.33
24	1.99	3000000	1.1886E+11	1331315.44	332828.86	0.33
25	1.99	3000000	1.1976E+11	1341394.76	335348.69	0.34
26	1.98	3000000	1.17665E+11	1317935.47	329483.87	0.33
27	2.08	3000000	1.30509E+11	1461795.48	365448.87	0.37
28	2.00	3000000	1.20362E+11	1348135.43	337033.86	0.34
29	2.01	3000000	1.21267E+11	1358278.10	339569.53	0.34
30	2.00	3000000	1.20362E+11	1348135.43	337033.86	0.34
Average	1.96		1.16E+11			0.33

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

Hiron Point

September

2005

month/year	Oct-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.99	3000000	1.19159E+11	1334670.99	333667.75	0.33
2	1.98	3000000	1.18561E+11	1327964.11	331991.03	0.33
3	1.98	3000000	1.17963E+11	1321274.13	330318.53	0.33
4	1.97	3000000	1.16477E+11	1304623.07	326155.77	0.33
5	1.95	3000000	1.15E+11	1288077.61	322019.40	0.32
6	1.94	3000000	1.13239E+11	1268362.43	317090.61	0.32
7	1.55	3000000	72785262300	815247.11	203811.78	0.20
8	1.94	3000000	1.13825E+11	1274917.26	318729.32	0.32
9	1.95	3000000	1.14118E+11	1278201.01	319550.25	0.32
10	1.94	3000000	1.13825E+11	1274917.26	318729.32	0.32
11	1.93	3000000	1.11783E+11	1252049.25	313012.31	0.31
12	2.08	3000000	1.30928E+11	1466484.48	366621.12	0.37
13	1.94	3000000	1.13532E+11	1271637.73	317909.43	0.32
14	1.95	3000000	1.14411E+11	1281488.99	320372.25	0.32
15	1.95	3000000	1.14411E+11	1281488.99	320372.25	0.32
16	1.94	3000000	1.13825E+11	1274917.26	318729.32	0.32
17	1.94	3000000	1.13532E+11	1271637.73	317909.43	0.32
18	1.93	3000000	1.12656E+11	1261824.49	315456.12	0.32
19	1.92	3000000	1.11493E+11	1248799.29	312199.82	0.31
20	1.51	3000000	68780926575	770395.68	192598.92	0.19
21	1.95	3000000	1.14118E+11	1278201.01	319550.25	0.32
22	1.95	3000000	1.14118E+11	1278201.01	319550.25	0.32
23	1.94	3000000	1.13239E+11	1268362.43	317090.61	0.32
24	1.94	3000000	1.13825E+11	1274917.26	318729.32	0.32
25	1.93	3000000	1.12364E+11	1258561.85	314640.46	0.31
26	1.91	3000000	1.0976E+11	1229388.20	307347.05	0.31
27	2.03	3000000	1.23902E+11	1387792.69	346948.17	0.35
28	1.93	3000000	1.12656E+11	1261824.49	315456.12	0.32
29	1.93	3000000	1.12073E+11	1255303.44	313825.86	0.31
30	1.92	3000000	1.10914E+11	1242312.03	310578.01	0.31
31	1.91	3000000	1.10048E+11	1232612.82	308153.21	0.31
Average	1.92		1.12E+11			0.31

Hiron Point

October

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

119
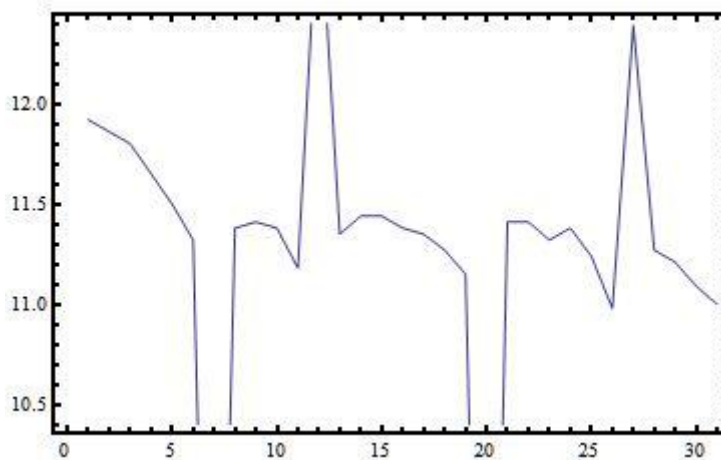
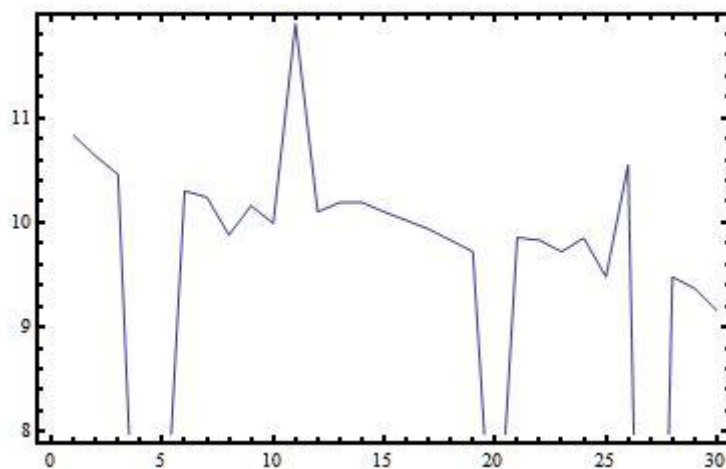| month/year			Nov-05			
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.90	3000000	1.08326E+11	1213328.43	303332.11	0.30
2	1.88	3000000	1.06334E+11	1191022.15	297755.54	0.30
3	1.86	3000000	1.04642E+11	1172067.19	293016.80	0.29
4	1.35	3000000	54570595894	611229.79	152807.45	0.15
5	1.46	3000000	64595261175	723513.23	180878.31	0.18
6	1.85	3000000	1.02963E+11	1153264.28	288316.07	0.29
7	1.84	3000000	1.02407E+11	1147030.43	286757.61	0.29
8	1.81	3000000	98826013575	1106922.20	276730.55	0.28
9	1.84	3000000	1.01575E+11	1137711.33	284427.83	0.28
10	1.82	3000000	99921030300	1119187.17	279796.79	0.28
11	1.99	3000000	1.1906E+11	1333552.00	333388.00	0.33
12	1.83	3000000	1.01022E+11	1131519.72	282879.93	0.28
13	1.84	3000000	1.01852E+11	1140813.47	285203.37	0.29
14	1.84	3000000	1.01852E+11	1140813.47	285203.37	0.29
15	1.83	3000000	1.01022E+11	1131519.72	282879.93	0.28
16	1.82	3000000	1.00196E+11	1122263.97	280565.99	0.28
17	1.82	3000000	99372767794	1113046.23	278261.56	0.28
18	1.81	3000000	98280767644	1100815.05	275203.76	0.28
19	1.80	3000000	97194800644	1088651.44	272162.86	0.27
20	1.45	3000000	63715426800	713658.45	178414.61	0.18
21	1.81	3000000	98553202073	1103866.51	275966.63	0.28
22	1.81	3000000	98280767644	1100815.05	275203.76	0.28
23	1.80	3000000	97194800644	1088651.44	272162.86	0.27
24	1.78	3000000	95845826011	1073541.96	268385.49	0.27
25	1.77	3000000	94773433598	1061530.39	265382.60	0.27
26	1.87	3000000	1.05487E+11	1181525.66	295381.42	0.30
27	1.78	3000000	95040966094	1064526.95	266131.74	0.27
28	1.77	3000000	94773433598	1061530.39	265382.60	0.27
29	1.76	3000000	93707074336	1049586.41	262396.60	0.26
30	1.74	3000000	91592455261	1025901.16	256475.29	0.26
Average	1.78		9.64E+10			0.27

Hiron Point

November

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

120

month/year	Dec-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.70	3000000	87179017500	976467.49	244116.87	0.24
2	1.73	3000000	90283073175	1011235.14	252808.78	0.25
3	1.66	3000000	83375304961	933863.18	233465.80	0.23
4	1.27	3000000	48654338175	544963.47	136240.87	0.14
5	1.65	3000000	82126254375	919872.92	229968.23	0.23
6	1.65	3000000	82126254375	919872.92	229968.23	0.23
7	1.65	3000000	81629273644	914306.38	228576.60	0.23
8	1.64	3000000	80886630586	905988.25	226497.06	0.23
9	1.64	3000000	80639837044	903223.98	225806.00	0.23
10	1.81	3000000	99190348800	1111003.01	277750.75	0.28
11	1.65	3000000	81877575473	917087.54	229271.88	0.23
12	1.64	3000000	81381348886	911529.45	227882.36	0.23
13	1.64	3000000	80886630586	905988.25	226497.06	0.23
14	1.63	3000000	79901718848	894956.53	223739.13	0.22
15	1.62	3000000	79166994300	886727.09	221681.77	0.22
16	1.61	3000000	77949994823	873095.82	218273.96	0.22
17	1.50	3000000	67872937500	760225.55	190056.39	0.19
18	1.25	3000000	47385700800	530753.82	132688.45	0.13
19	1.59	3000000	76262032575	854189.43	213547.36	0.21
20	1.58	3000000	75544276261	846150.05	211537.51	0.21
21	1.58	3000000	74829913594	838148.67	209537.17	0.21
22	1.56	3000000	73646850586	824897.52	206224.38	0.21
23	1.56	3000000	72941537644	816997.51	204249.38	0.20
24	1.54	3000000	71773557511	803915.29	200978.82	0.20
25	1.53	3000000	70845960698	793525.55	198381.39	0.20
26	1.65	3000000	81794766300	916160.02	229040.00	0.23
27	1.54	3000000	71077294294	796116.65	199029.16	0.20
28	1.52	3000000	69694948800	780633.39	195158.35	0.20
29	1.50	3000000	67872937500	760225.55	190056.39	0.19
30	1.48	3000000	66298473886	742590.43	185647.61	0.19
31	1.46	3000000	64081291261	717756.40	179439.10	0.18
Average	1.58		7.58E+10			0.21
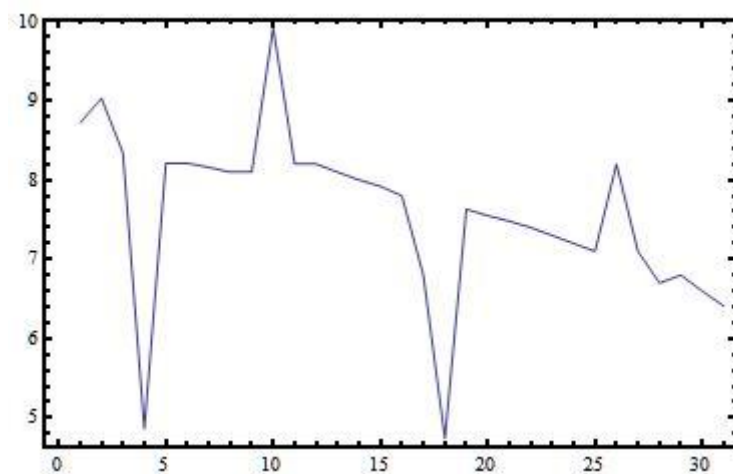
Hiron Point

December

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

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CI: Calculation for Khepupara during Year 2013

month/year	Jan-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.31	3000000	51965217773	582047.69	145511.92	0.15
2	1.45	3000000	63423489375	710388.55	177597.14	0.18
3	1.46	3000000	64301312700	720220.80	180055.20	0.18
4	1.47	3000000	65185169175	730120.62	182530.16	0.18
5	1.50	3000000	67421205394	755165.83	188791.46	0.19
6	1.68	3000000	84802291575	949846.46	237461.61	0.24
7	1.51	3000000	69008866523	772948.77	193237.19	0.19
8	1.51	3000000	69008866523	772948.77	193237.19	0.19
9	1.51	3000000	68780926575	770395.68	192598.92	0.19
10	1.48	3000000	65852020786	737589.84	184397.46	0.18
11	1.43	3000000	61901815823	693344.71	173336.18	0.17
12	1.41	3000000	59760047573	669355.37	167338.84	0.17
13	1.32	3000000	52163369044	584267.13	146066.78	0.15
14	1.43	3000000	61901815823	693344.71	173336.18	0.17
15	1.42	3000000	61040583661	683698.29	170924.57	0.17
16	1.43	3000000	61255326094	686103.56	171525.89	0.17
17	1.41	3000000	59972527575	671735.30	167933.82	0.17
18	1.39	3000000	58493086073	655164.49	163791.12	0.16
19	1.37	3000000	56824920098	636479.84	159119.96	0.16
20	1.37	3000000	56411649323	631850.91	157962.73	0.16
21	1.45	3000000	63132222300	707126.15	176781.54	0.18
22	1.35	3000000	54977079375	615782.70	153945.67	0.15
23	1.34	3000000	54367919761	608959.67	152239.92	0.15
24	1.34	3000000	53762153794	602174.66	150543.67	0.15
25	1.33	3000000	53560985948	599921.44	149980.36	0.15
26	1.34	3000000	54165620700	606693.78	151673.45	0.15
27	1.23	3000000	45267478594	507028.21	126757.05	0.13
28	0.93	3000000	26090357175	292230.70	73057.68	0.07
29	1.51	3000000	68780926575	770395.68	192598.92	0.19
30	1.43	3000000	61470445598	688513.06	172128.26	0.17
31	1.4375	3000000	62334694336	698193.26	174548.32	0.17
Average						0.17
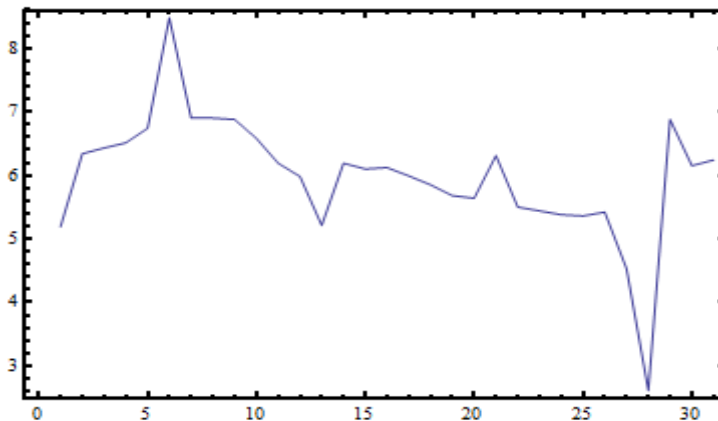
Khepupara

January

2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

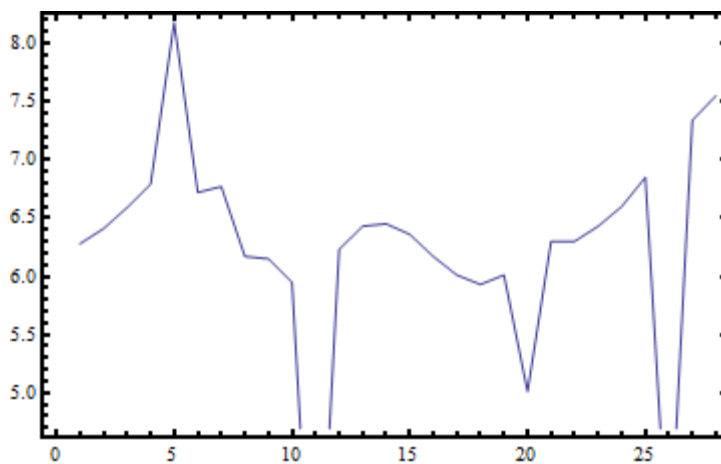| month/year	Feb-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.44	3000000	62769081136	703058.70	175764.68	0.18
2	1.46	3000000	64081291261	717756.40	179439.10	0.18
3	1.48	3000000	65852020786	737589.84	184397.46	0.18
4	1.50	3000000	67872937500	760225.55	190056.39	0.19
5	1.65	3000000	81794766300	916160.02	229040.00	0.23
6	1.49	3000000	67195904948	752642.30	188160.58	0.19
7	1.50	3000000	67646882911	757693.58	189423.40	0.19
8	1.43	3000000	61685942175	690926.77	172731.69	0.17
9	1.43	3000000	61470445598	688513.06	172128.26	0.17
10	1.41	3000000	59547944644	666979.67	166744.92	0.17
11	0.90	3000000	24434257500	273681.20	68420.30	0.07
12	1.44	3000000	62334694336	698193.26	174548.32	0.17
13	1.46	3000000	64301312700	720220.80	180055.20	0.18
14	1.46	3000000	64521711211	722689.42	180672.35	0.18
15	1.45	3000000	63642379598	712840.27	178210.07	0.18
16	1.43	3000000	61685942175	690926.77	172731.69	0.17
17	1.41	3000000	60185384648	674119.45	168529.86	0.17
18	1.40	3000000	59336218786	664608.19	166152.05	0.17
19	1.41	3000000	60185384648	674119.45	168529.86	0.17
20	1.29	3000000	50198824575	562262.82	140565.71	0.14
21	1.45	3000000	62986840144	705497.76	176374.44	0.18
22	1.45	3000000	62986840144	705497.76	176374.44	0.18
23	1.46	3000000	64301312700	720220.80	180055.20	0.18
24	1.48	3000000	66075058800	740088.02	185022.01	0.19
25	1.51	3000000	68553363698	767846.82	191961.70	0.19
26	1.07	3000000	34752284700	389250.50	97312.63	0.10
27	1.56	3000000	73411369200	822259.96	205564.99	0.21
28	1.58	3000000	75544276261	846150.05	211537.51	0.21
Average						0.17

Khepupara

February

2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

month/year	Mar-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.60	3000000	77224320000	864967.74	216241.94	0.22
2	1.61	3000000	77707726144	870382.24	217595.56	0.22
3	1.61	3000000	77949994823	873095.82	218273.96	0.22
4	1.62	3000000	78922840261	883992.39	220998.10	0.22
5	1.63	3000000	80393420573	900463.94	225115.99	0.23
6	1.81	3000000	98462348700	1102848.89	275712.22	0.28
7	1.65	3000000	81629273644	914306.38	228576.60	0.23
8	1.66	3000000	82624743394	925456.36	231364.09	0.23
9	1.64	3000000	80886630586	905988.25	226497.06	0.23
10	1.59	3000000	76502038823	856877.67	214219.42	0.21
11	1.58	3000000	75544276261	846150.05	211537.51	0.21
12	1.60	3000000	77224320000	864967.74	216241.94	0.22
13	1.17	3000000	41058937500	459889.53	114972.38	0.11
14	1.66	3000000	82624743394	925456.36	231364.09	0.23
15	1.66	3000000	82624743394	925456.36	231364.09	0.23
16	1.65	3000000	81629273644	914306.38	228576.60	0.23
17	1.63	3000000	79656433594	892209.16	223052.29	0.22
18	1.61	3000000	77707726144	870382.24	217595.56	0.22
19	1.60	3000000	77224320000	864967.74	216241.94	0.22
20	1.60	3000000	77465834536	867672.88	216918.22	0.22
21	1.64	3000000	80886630586	905988.25	226497.06	0.23
22	1.47	3000000	65407075973	732606.14	183151.53	0.18
23	1.71	3000000	88207669575	987989.13	246997.28	0.25
24	1.74	3000000	91329824700	1022959.51	255739.88	0.26
25	1.77	3000000	94506278175	1058538.06	264634.52	0.26
26	1.79	3000000	96924251573	1085621.10	271405.27	0.27
27	1.82	3000000	99372767794	1113046.23	278261.56	0.28
28	1.44	3000000	62769081136	703058.70	175764.68	0.18
29	1.85	3000000	1.03242E+11	1156387.54	289096.88	0.29
30	1.86	3000000	1.04361E+11	1168922.81	292230.70	0.29
31	1.8575	3000000	1.04081E+11	1165782.66	291445.66	0.29
Average						0.23

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

Khepupara

March

2013

month/year	Apr-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.85	3000000	1.03242E+11	1156387.54	289096.88	0.29
2	1.85	3000000	1.02963E+11	1153264.28	288316.07	0.29
3	1.86	3000000	1.03801E+11	1162646.73	290661.68	0.29
4	2.09	3000000	1.31347E+11	1471180.98	367795.25	0.37
5	1.88	3000000	1.06051E+11	1187852.43	296963.11	0.30
6	1.88	3000000	1.06902E+11	1197374.25	299343.56	0.30
7	1.88	3000000	1.06618E+11	1194196.09	298549.02	0.30
8	1.85	3000000	1.03242E+11	1156387.54	289096.88	0.29
9	1.85	3000000	1.02685E+11	1150145.24	287536.31	0.29
10	1.86	3000000	1.04642E+11	1172067.19	293016.80	0.29
11	1.88	3000000	1.06902E+11	1197374.25	299343.56	0.30
12	1.48	3000000	66075058800	740088.02	185022.01	0.19
13	1.91	3000000	1.09472E+11	1226167.80	306541.95	0.31
14	1.90	3000000	1.08326E+11	1213328.43	303332.11	0.30
15	1.88	3000000	1.06902E+11	1197374.25	299343.56	0.30
16	1.87	3000000	1.04923E+11	1175215.79	293803.95	0.29
17	1.86	3000000	1.04361E+11	1168922.81	292230.70	0.29
18	1.87	3000000	1.04923E+11	1175215.79	293803.95	0.29
19	1.89	3000000	1.0804E+11	1210129.15	302532.29	0.30
20	2.12	3000000	1.35577E+11	1518558.99	379639.75	0.38
21	2.01	3000000	1.21873E+11	1365061.01	341265.25	0.34
22	2.05	3000000	1.26463E+11	1416471.26	354117.81	0.35
23	2.08	3000000	1.30509E+11	1461795.48	365448.87	0.37
24	2.09	3000000	1.32082E+11	1479417.93	369854.48	0.37
25	2.10	3000000	1.33348E+11	1493591.92	373397.98	0.37
26	2.11	3000000	1.33665E+11	1497145.97	374286.49	0.37
27	1.65	3000000	82126254375	919872.92	229968.23	0.23
28	2.14	3000000	1.37824E+11	1543733.02	385933.25	0.39
29	2.11	3000000	1.34619E+11	1507833.48	376958.37	0.38
30	2.10	3000000	1.33031E+11	1490042.09	372510.52	0.37
Average						0.32

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

Khepupara

April

2013

month/year	May-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.09	3000000	1.31452E+11	1472356.28	368089.07	0.37
2	2.09	3000000	1.32082E+11	1479417.93	369854.48	0.37
3	2.37	3000000	1.68962E+11	1892492.36	473123.09	0.47
4	2.10	3000000	1.32398E+11	1482955.10	370738.77	0.37
5	2.09	3000000	1.31767E+11	1475885.00	368971.25	0.37
6	2.10	3000000	1.33031E+11	1490042.09	372510.52	0.37
7	2.09	3000000	1.31452E+11	1472356.28	368089.07	0.37
8	2.08	3000000	1.30823E+11	1465311.53	366327.88	0.37
9	2.09	3000000	1.32082E+11	1479417.93	369854.48	0.37
10	2.11	3000000	1.33665E+11	1497145.97	374286.49	0.37
11	2.12	3000000	1.34938E+11	1511404.42	377851.11	0.38
12	1.74	3000000	91680082575	1026882.65	256720.66	0.26
13	2.13	3000000	1.36859E+11	1532918.81	383229.70	0.38
14	2.12	3000000	1.35577E+11	1518558.99	379639.75	0.38
15	2.11	3000000	1.33665E+11	1497145.97	374286.49	0.37
16	2.10	3000000	1.33031E+11	1490042.09	372510.52	0.37
17	2.11	3000000	1.34619E+11	1507833.48	376958.37	0.38
18	2.13	3000000	1.36859E+11	1532918.81	383229.70	0.38
19	2.42	3000000	1.7715E+11	1984203.71	496050.93	0.50
20	2.22	3000000	1.49004E+11	1668950.61	417237.65	0.42
21	2.26	3000000	1.54075E+11	1725745.80	431436.45	0.43
22	2.29	3000000	1.58192E+11	1771866.15	442966.54	0.44
23	2.32	3000000	1.61665E+11	1810764.35	452691.09	0.45
24	2.33	3000000	1.63065E+11	1826441.89	456610.47	0.46
25	2.32	3000000	1.62714E+11	1822516.17	455629.04	0.46
26	2.32	3000000	1.61665E+11	1810764.35	452691.09	0.45
27	1.87	3000000	1.05111E+11	1177317.20	294329.30	0.29
28	2.31	3000000	1.61316E+11	1806855.53	451713.88	0.45
29	2.30	3000000	1.5923E+11	1783491.26	445872.82	0.45
30	2.29	3000000	1.57847E+11	1767999.56	441999.89	0.44
31	2.28	3000000	1.56814E+11	1756425.12	439106.28	0.44
Average						0.40

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

month/year	Jun-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.28	3000000	1.56127E+11	1748729.95	437182.49	0.44
2	2.56	3000000	1.97694E+11	2214317.42	553579.35	0.55
3	2.25	3000000	1.52375E+11	1706708.48	426677.12	0.43
4	2.25	3000000	1.52375E+11	1706708.48	426677.12	0.43
5	2.25	3000000	1.52375E+11	1706708.48	426677.12	0.43
6	2.25	3000000	1.52375E+11	1706708.48	426677.12	0.43
7	2.25	3000000	1.53054E+11	1714310.74	428577.68	0.43
8	2.26	3000000	1.54416E+11	1729565.93	432391.48	0.43
9	2.29	3000000	1.57847E+11	1767999.56	441999.89	0.44
10	2.30	3000000	1.59924E+11	1791262.46	447815.61	0.45
11	1.92	3000000	1.11589E+11	1249882.14	312470.54	0.31
12	2.31	3000000	1.60619E+11	1799050.55	449762.64	0.45
13	2.30	3000000	1.59577E+11	1787374.75	446843.69	0.45
14	2.30	3000000	1.5923E+11	1783491.26	445872.82	0.45
15	2.31	3000000	1.60271E+11	1795154.39	448788.60	0.45
16	2.32	3000000	1.62714E+11	1822516.17	455629.04	0.46
17	2.35	3000000	1.65882E+11	1857999.70	464499.93	0.46
18	2.68	3000000	2.17202E+11	2432815.63	608203.91	0.61
19	2.41	3000000	1.74479E+11	1954294.94	488573.73	0.49
20	2.43	3000000	1.77759E+11	1991032.84	497758.21	0.50
21	2.46	3000000	1.8181E+11	2036399.30	509099.82	0.51
22	2.47	3000000	1.84411E+11	2065534.94	516383.74	0.52
23	2.48	3000000	1.84784E+11	2069714.07	517428.52	0.52
24	2.47	3000000	1.84038E+11	2061360.04	515340.01	0.52
25	2.47	3000000	1.83294E+11	2053022.90	513255.72	0.51
26	2.46	3000000	1.8181E+11	2036399.30	509099.82	0.51
27	2.45	3000000	1.80332E+11	2019843.28	504960.82	0.50
28	2.43	3000000	1.78126E+11	1995135.95	498783.99	0.50
29	2.41	3000000	1.75569E+11	1966502.89	491625.72	0.49
30	2.39	3000000	1.7267E+11	1934032.82	483508.20	0.48
Average						0.47

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

Khepupara

Jun

2013

Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
month/year			Jul-13			
1	2.38	3000000	1.70512E+11	1909857.64	477464.41	0.48
2	2.63	3000000	2.08125E+11	2331148.13	582787.03	0.58
3	2.35	3000000	1.65882E+11	1857999.70	464499.93	0.46
4	2.34	3000000	1.65176E+11	1850084.91	462521.23	0.46
5	2.35	3000000	1.65882E+11	1857999.70	464499.93	0.46
6	2.35	3000000	1.6659E+11	1865931.39	466482.85	0.47
7	2.37	3000000	1.69438E+11	1897827.07	474456.77	0.47
8	2.40	3000000	1.73393E+11	1942124.99	485531.25	0.49
9	2.43	3000000	1.78492E+11	1999243.27	499810.82	0.50
10	2.04	3000000	1.25128E+11	1401521.80	350380.45	0.35
11	2.45	3000000	1.80701E+11	2023975.95	505993.99	0.51
12	2.45	3000000	1.8107E+11	2028112.84	507028.21	0.51
13	2.45	3000000	1.80332E+11	2019843.28	504960.82	0.50
14	2.45	3000000	1.8144E+11	2032253.96	508063.49	0.51
15	2.46	3000000	1.82922E+11	2048860.66	512215.17	0.51
16	2.47	3000000	1.84411E+11	2065534.94	516383.74	0.52
17	2.49	3000000	1.8628E+11	2086472.82	521618.21	0.52
18	2.80	3000000	2.37063E+11	2655274.52	663818.63	0.66
19	2.52	3000000	1.91185E+11	2141405.45	535351.36	0.54
20	2.54	3000000	1.94234E+11	2175564.92	543891.23	0.54
21	2.56	3000000	1.97694E+11	2214317.42	553579.35	0.55
22	2.57	3000000	1.98467E+11	2222975.54	555743.89	0.56
23	2.56	3000000	1.98081E+11	2218644.37	554661.09	0.55
24	2.07	3000000	1.29257E+11	1447773.55	361943.39	0.36
25	2.55	3000000	1.96153E+11	2197051.85	549262.96	0.55
26	2.55	3000000	1.95384E+11	2188444.41	547111.10	0.55
27	2.52	3000000	1.91565E+11	2145660.60	536415.15	0.54
28	2.49	3000000	1.87031E+11	2094877.54	523719.38	0.52
29	2.46	3000000	1.8218E+11	2040548.86	510137.22	0.51
30	2.43	3000000	1.77759E+11	1991032.84	497758.21	0.50
31	2.41	3000000	1.75206E+11	1962429.35	490607.34	0.49
Average						0.51

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

Khepupara

July

2013

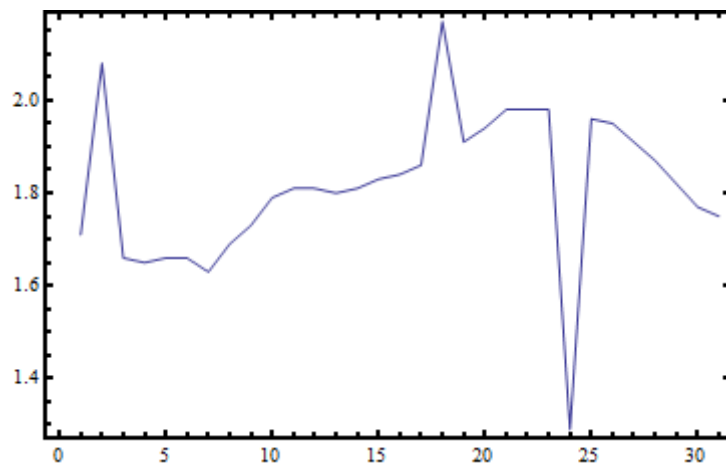| month/year	Aug-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.61	3000000	2.04968E+11	2295783.57	573945.89	0.57
2	2.39	3000000	1.7267E+11	1934032.82	483508.20	0.48
3	2.40	3000000	1.73031E+11	1938076.79	484519.20	0.48
4	2.41	3000000	1.75206E+11	1962429.35	490607.34	0.49
5	2.43	3000000	1.78126E+11	1995135.95	498783.99	0.50
6	2.47	3000000	1.83294E+11	2053022.90	513255.72	0.51
7	2.51	3000000	1.89291E+11	2120193.05	530048.26	0.53
8	2.07	3000000	1.29674E+11	1452440.02	363110.00	0.36
9	2.54	3000000	1.93852E+11	2171280.21	542820.05	0.54
10	2.54	3000000	1.93852E+11	2171280.21	542820.05	0.54
11	2.53	3000000	1.93088E+11	2162723.45	540680.86	0.54
12	2.53	3000000	1.9347E+11	2166999.71	541749.93	0.54
13	2.54	3000000	1.94617E+11	2179853.86	544963.47	0.54
14	2.55	3000000	1.95768E+11	2192746.02	548186.50	0.55
15	2.54	3000000	1.93852E+11	2171280.21	542820.05	0.54
16	2.79	3000000	2.35375E+11	2636364.61	659091.15	0.66
17	2.54	3000000	1.95001E+11	2184147.02	546036.76	0.55
18	2.56	3000000	1.97308E+11	2209994.69	552498.67	0.55
19	2.57	3000000	1.9963E+11	2235994.41	558998.60	0.56
20	2.57	3000000	1.98467E+11	2222975.54	555743.89	0.56
21	2.57	3000000	1.98467E+11	2222975.54	555743.89	0.56
22	2.57	3000000	1.98854E+11	2227310.94	556827.74	0.56
23	2.04	3000000	1.25948E+11	1410712.08	352678.02	0.35
24	2.56	3000000	1.98081E+11	2218644.37	554661.09	0.55
25	2.60	3000000	2.03529E+11	2279665.14	569916.29	0.57
26	2.49	3000000	1.87406E+11	2099086.23	524771.56	0.52
27	2.46	3000000	1.8181E+11	2036399.30	509099.82	0.51
28	2.42	3000000	1.76298E+11	1974662.65	493665.66	0.49
29	2.38	3000000	1.70871E+11	1913876.28	478469.07	0.48
30	2.37	3000000	1.69438E+11	1897827.07	474456.77	0.47
31	2.523333	3000000	1.92072E+11	2151340.71	537835.18	0.54
Average						0.52
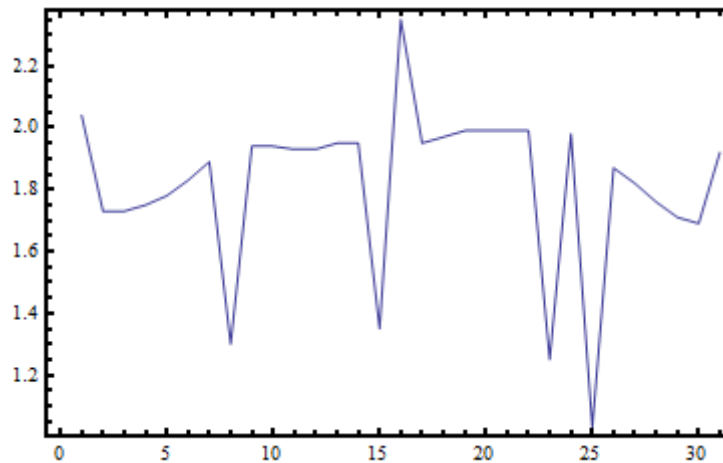
Khepupara

August

2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

month/year	Sep-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.39	3000000	1.71949E+11	1925957.53	481489.38	0.48
2	2.40	3000000	1.74117E+11	1950234.07	487558.52	0.49
3	2.43	3000000	1.77759E+11	1991032.84	497758.21	0.50
4	2.46	3000000	1.82922E+11	2048860.66	512215.17	0.51
5	2.50	3000000	1.87783E+11	2103299.15	525824.79	0.53
6	2.52	3000000	1.90805E+11	2137154.53	534288.63	0.53
7	2.01	3000000	1.22277E+11	1369592.33	342398.08	0.34
8	2.52	3000000	1.91565E+11	2145660.60	536415.15	0.54
9	2.51	3000000	1.90426E+11	2132907.82	533226.96	0.53
10	2.45	3000000	1.8107E+11	2028112.84	507028.21	0.51
11	2.50	3000000	1.88913E+11	2115963.24	528990.81	0.53
12	2.50	3000000	1.88159E+11	2107516.29	526879.07	0.53
13	2.47	3000000	1.84038E+11	2061360.04	515340.01	0.52
14	2.69	3000000	2.18282E+11	2444919.17	611229.79	0.61
15	2.47	3000000	1.83294E+11	2053022.90	513255.72	0.51
16	2.47	3000000	1.84411E+11	2065534.94	516383.74	0.52
17	2.48	3000000	1.85531E+11	2078085.00	519521.25	0.52
18	2.45	3000000	1.8144E+11	2032253.96	508063.49	0.51
19	2.45	3000000	1.80332E+11	2019843.28	504960.82	0.50
20	2.45	3000000	1.80332E+11	2019843.28	504960.82	0.50
21	1.91	3000000	1.09664E+11	1228314.26	307078.57	0.31
22	2.44	3000000	1.79227E+11	2007470.60	501867.65	0.50
23	2.41	3000000	1.75206E+11	1962429.35	490607.34	0.49
24	2.37	3000000	1.69438E+11	1897827.07	474456.77	0.47
25	2.33	3000000	1.63767E+11	1834306.01	458576.50	0.46
26	2.29	3000000	1.58192E+11	1771866.15	442966.54	0.44
27	2.25	3000000	1.53054E+11	1714310.74	428577.68	0.43
28	2.23	3000000	1.50348E+11	1684003.08	421000.77	0.42
29	2.11	3000000	1.34619E+11	1507833.48	376958.37	0.38
30	2.28	3000000	1.56127E+11	1748729.95	437182.49	0.44
Average						0.48

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

Khepupara

September

2013

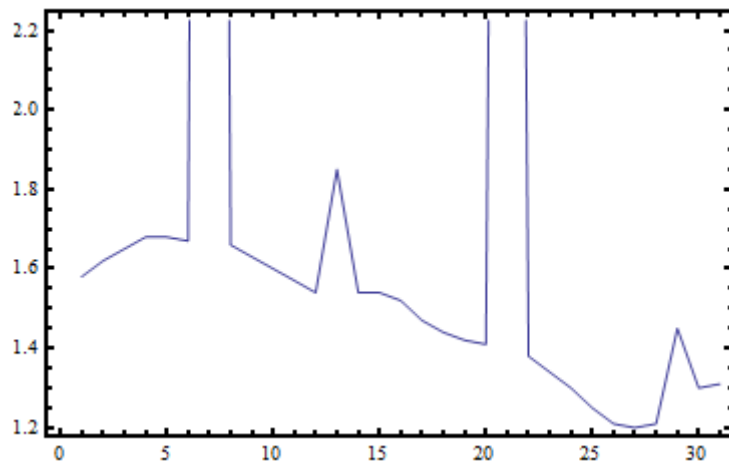| month/year	Oct-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.29	3000000	1.58192E+11	1771866.15	442966.54	0.44
2	2.32	3000000	1.61665E+11	1810764.35	452691.09	0.45
3	2.34	3000000	1.65529E+11	1854040.19	463510.05	0.46
4	2.36	3000000	1.67655E+11	1877860.59	469465.15	0.47
5	2.36	3000000	1.68011E+11	1881845.44	470461.36	0.47
6	2.36	3000000	1.673E+11	1873879.97	468469.99	0.47
7	1.82	3000000	99555354375	1115091.33	278772.83	0.28
8	2.35	3000000	1.65882E+11	1857999.70	464499.93	0.46
9	2.33	3000000	1.63065E+11	1826441.89	456610.47	0.46
10	2.31	3000000	1.60271E+11	1795154.39	448788.60	0.45
11	2.28	3000000	1.57158E+11	1760279.04	440069.76	0.44
12	2.26	3000000	1.54075E+11	1725745.80	431436.45	0.43
13	2.48	3000000	1.85033E+11	2072502.50	518125.63	0.52
14	2.26	3000000	1.53734E+11	1721929.89	430482.47	0.43
15	2.26	3000000	1.53734E+11	1721929.89	430482.47	0.43
16	2.25	3000000	1.52375E+11	1706708.48	426677.12	0.43
17	2.21	3000000	1.46999E+11	1646498.62	411624.65	0.41
18	2.19	3000000	1.44018E+11	1613105.71	403276.43	0.40
19	2.17	3000000	1.42375E+11	1594701.92	398675.48	0.40
20	2.16	3000000	1.40741E+11	1576403.71	394100.93	0.39
21	1.65	3000000	82126254375	919872.92	229968.23	0.23
22	2.14	3000000	1.3847E+11	1550963.61	387740.90	0.39
23	2.11	3000000	1.34619E+11	1507833.48	376958.37	0.38
24	2.08	3000000	1.29882E+11	1454776.07	363694.02	0.36
25	2.04	3000000	1.25538E+11	1406113.19	351528.30	0.35
26	2.01	3000000	1.21873E+11	1365061.01	341265.25	0.34
27	2.00	3000000	1.20663E+11	1351512.10	337878.02	0.34
28	2.01	3000000	1.2157E+11	1361667.44	340416.86	0.34
29	2.19	3000000	1.44678E+11	1620496.79	405124.20	0.41
30	2.07	3000000	1.29257E+11	1447773.55	361943.39	0.36
31	2.09	3000000	1.31137E+11	1468831.79	367207.95	0.37
Average						0.41

Khepupara October 2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

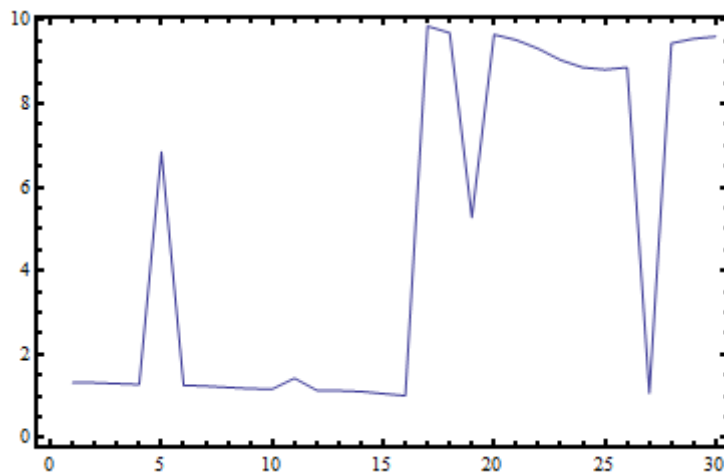| month/year	Nov-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.09	3000000	1.32082E+11	1479417.93	369854.48	0.37
2	2.09	3000000	1.31767E+11	1475885.00	368971.25	0.37
3	2.08	3000000	1.29882E+11	1454776.07	363694.02	0.36
4	2.06	3000000	1.27701E+11	1430341.15	357585.29	0.36
5	1.51	3000000	68477593200	766998.13	191749.53	0.19
6	2.05	3000000	1.26154E+11	1413014.34	353253.59	0.35
7	2.03	3000000	1.24004E+11	1388934.20	347233.55	0.35
8	2.01	3000000	1.21267E+11	1358278.10	339569.53	0.34
9	1.98	3000000	1.18561E+11	1327964.11	331991.03	0.33
10	1.97	3000000	1.17368E+11	1314601.03	328650.26	0.33
11	2.18	3000000	1.42922E+11	1600824.78	400206.20	0.40
12	1.95	3000000	1.14118E+11	1278201.01	319550.25	0.32
13	1.94	3000000	1.13239E+11	1268362.43	317090.61	0.32
14	1.92	3000000	1.11203E+11	1245553.55	311388.39	0.31
15	1.88	3000000	1.06334E+11	1191022.15	297755.54	0.30
16	1.83	3000000	1.01298E+11	1134613.41	283653.35	0.28
17	1.81	3000000	98553202073	1103866.51	275966.63	0.28
18	1.79	3000000	96924251573	1085621.10	271405.27	0.27
19	1.32	3000000	52826596575	591695.75	147923.94	0.15
20	1.79	3000000	96654079575	1082594.98	270648.74	0.27
21	1.78	3000000	95308875661	1067527.73	266881.93	0.27
22	1.76	3000000	93176157136	1043639.75	260909.94	0.26
23	1.73	3000000	90544195448	1014159.90	253539.97	0.25
24	1.72	3000000	88724258044	993775.29	248443.82	0.25
25	1.71	3000000	88207669575	987989.13	246997.28	0.25
26	1.72	3000000	88724258044	993775.29	248443.82	0.25
27	1.89	3000000	1.07755E+11	1206934.09	301733.52	0.30
28	1.77	3000000	94506278175	1058538.06	264634.52	0.26
29	1.78	3000000	95577162300	1070532.73	267633.18	0.27
30	1.79	3000000	96114866794	1076555.41	269138.85	0.27
Average						0.30

Khepupara

December

2013

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

| month/year	Dec-13					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.77	3000000	94773433598	1061530.39	265382.60	0.27
2	1.76	3000000	92911264144	1040672.76	260168.19	0.26
3	1.74	3000000	90805694794	1017088.88	254272.22	0.25
4	1.87	3000000	1.04923E+11	1175215.79	293803.95	0.29
5	1.72	3000000	88724258044	993775.29	248443.82	0.25
6	1.71	3000000	87692589394	982219.86	245554.97	0.25
7	1.69	3000000	86411487698	967870.61	241967.65	0.24
8	1.68	3000000	85393393636	956467.22	239116.81	0.24
9	1.67	3000000	84129260175	942308.02	235577.01	0.24
10	1.65	3000000	82375310348	922662.53	230665.63	0.23
11	1.84	3000000	1.01759E+11	1139778.96	284944.74	0.28
12	1.62	3000000	78679063294	881261.91	220315.48	0.22
13	1.60	3000000	76742422144	859570.14	214892.54	0.21
14	1.56	3000000	73411369200	822259.96	205564.99	0.21
15	1.52	3000000	69237183544	775506.09	193876.52	0.19
16	1.49	3000000	66522266044	745097.07	186274.27	0.19
17	1.47	3000000	64963639448	727639.33	181909.83	0.18
18	1.04	3000000	32418461175	363110.00	90777.50	0.09
19	1.48	3000000	65629359844	735095.88	183773.97	0.18
20	1.49	3000000	66522266044	745097.07	186274.27	0.19
21	1.49	3000000	66746435273	747607.92	186901.98	0.19
22	1.48	3000000	66075058800	740088.02	185022.01	0.19
23	1.47	3000000	65185169175	730120.62	182530.16	0.18
24	1.47	3000000	65185169175	730120.62	182530.16	0.18
25	1.49	3000000	66522266044	745097.07	186274.27	0.19
26	1.50	3000000	68099369161	762761.75	190690.44	0.19
27	1.67	3000000	84129260175	942308.02	235577.01	0.24
28	1.56	3000000	73176264886	819626.62	204906.66	0.20
29	1.54	3000000	71541092700	801311.52	200327.88	0.20
30	1.54	3000000	71773557511	803915.29	200978.82	0.20
31	1.52	3000000	69924397036	783203.37	195800.84	0.20
Average						0.21
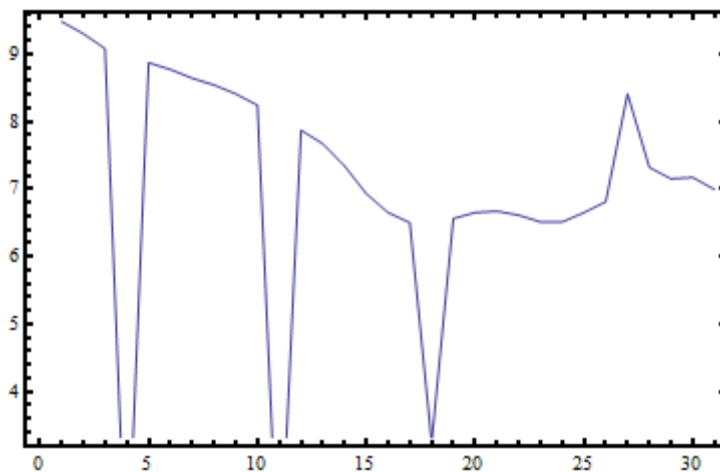
Khepupara

December

2013
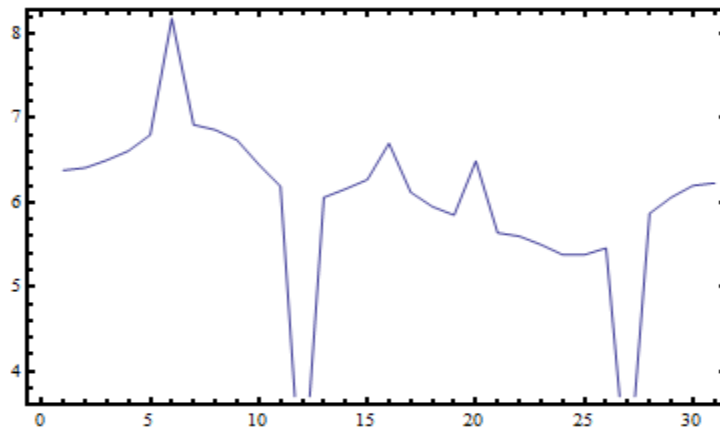
Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

CII: Calculation for Khepupara during Year 2009

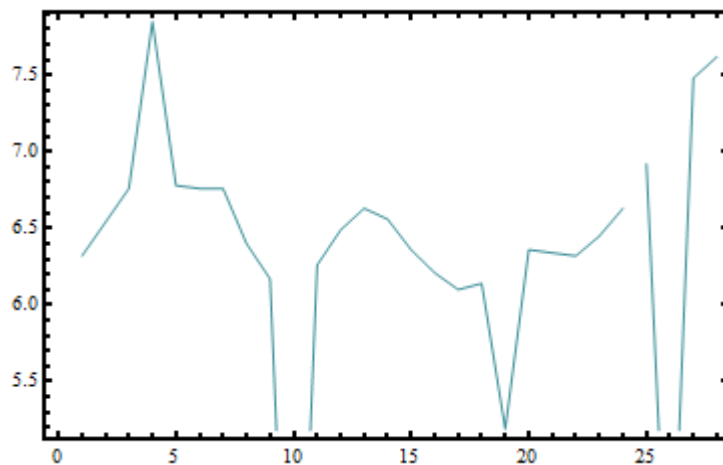| Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
month/year	Jan-09					
1	1.46	3000000	63861646894	715296.22	178824.06	0.18
2	1.46	3000000	64081291261	717756.40	179439.10	0.18
3	1.47	3000000	64963639448	727639.33	181909.83	0.18
4	1.48	3000000	66075058800	740088.02	185022.01	0.19
5	1.50	3000000	68099369161	762761.75	190690.44	0.19
6	1.65	3000000	81794766300	916160.02	229040.00	0.23
7	1.52	3000000	69237183544	775506.09	193876.52	0.19
8	1.51	3000000	68553363698	767846.82	191961.70	0.19
9	1.50	3000000	67421205394	755165.83	188791.46	0.19
10	1.46	3000000	64521711211	722689.42	180672.35	0.18
11	1.43	3000000	61901815823	693344.71	173336.18	0.17
12	0.90	3000000	24434257500	273681.20	68420.30	0.07
13	1.42	3000000	60612230011	678900.43	169725.11	0.17
14	1.43	3000000	61685942175	690926.77	172731.69	0.17
15	1.44	3000000	62769081136	703058.70	175764.68	0.18
16	1.49	3000000	66970981575	750123.00	187530.75	0.19
17	1.43	3000000	61255326094	686103.56	171525.89	0.17
18	1.41	3000000	59547944644	666979.67	166744.92	0.17
19	1.39	3000000	58493086073	655164.49	163791.12	0.16
20	1.47	3000000	64889880000	726813.17	181703.29	0.18
21	1.37	3000000	56411649323	631850.91	157962.73	0.16
22	1.36	3000000	55999886836	627238.88	156809.72	0.16
23	1.35	3000000	54977079375	615782.70	153945.67	0.15
24	1.34	3000000	53762153794	602174.66	150543.67	0.15
25	1.34	3000000	53762153794	602174.66	150543.67	0.15
26	1.35	3000000	54570595894	611229.79	152807.45	0.15
27	0.93	3000000	26277720000	294329.30	73582.33	0.07
28	1.40	3000000	58703303644	657519.08	164379.77	0.16
29	1.42	3000000	60612230011	678900.43	169725.11	0.17
30	1.43	3000000	61901815823	693344.71	173336.18	0.17
31	1.44	3000000	62334694336	698193.26	174548.32	0.17
Average						0.17

Khepupara

January

2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

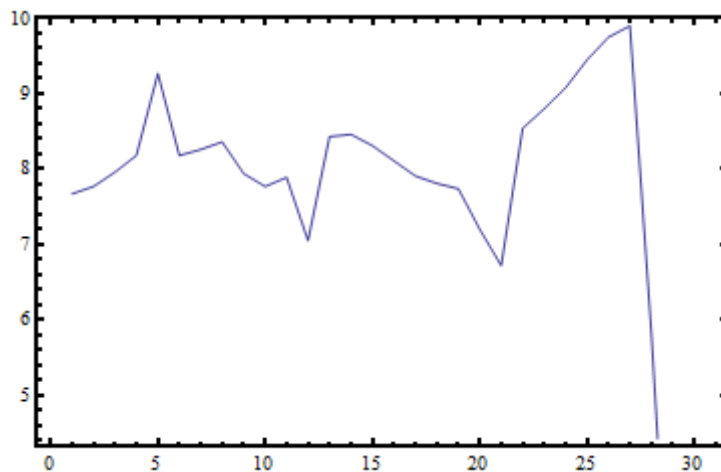| month/year	Feb-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.45	3000000	63204976223	707941.04	176985.26	0.18
2	1.47	3000000	65407075973	732606.14	183151.53	0.18
3	1.50	3000000	67646882911	757693.58	189423.40	0.19
4	1.61	3000000	78516754800	879443.94	219860.98	0.22
5	1.50	3000000	67872937500	760225.55	190056.39	0.19
6	1.50	3000000	67646882911	757693.58	189423.40	0.19
7	1.50	3000000	67646882911	757693.58	189423.40	0.19
8	1.46	3000000	64081291261	717756.40	179439.10	0.18
9	1.43	3000000	61685942175	690926.77	172731.69	0.17
10	0.91	3000000	24980257575	279796.79	69949.20	0.07
11	1.44	3000000	62551699200	700623.87	175155.97	0.18
12	1.47	3000000	64963639448	727639.33	181909.83	0.18
13	1.48	3000000	66298473886	742590.43	185647.61	0.19
14	1.48	3000000	65629359844	735095.88	183773.97	0.18
15	1.45	3000000	63642379598	712840.27	178210.07	0.18
16	1.44	3000000	62118066544	695766.87	173941.72	0.17
17	1.42	3000000	61040583661	683698.29	170924.57	0.17
18	1.43	3000000	61470445598	688513.06	172128.26	0.17
19	1.31	3000000	51965217773	582047.69	145511.92	0.15
20	1.45	3000000	63642379598	712840.27	178210.07	0.18
21	1.45	3000000	63423489375	710388.55	177597.14	0.18
22	1.45	3000000	63204976223	707941.04	176985.26	0.18
23	1.46	3000000	64521711211	722689.42	180672.35	0.18
24	1.48	3000000	66298473886	742590.43	185647.61	0.19
25	1.52	3000000	69237183544	775506.09	193876.52	0.19
26	1.10	3000000	36500557500	408832.41	102208.10	0.10
27	1.58	3000000	74829913594	838148.67	209537.17	0.21
28	1.59	3000000	76262032575	854189.43	213547.36	0.21
Average						0.18

Khepupara February 2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

month/year	Mar-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.60	3000000	76742422144	859570.14	214892.54	0.21
2	1.61	3000000	77707726144	870382.24	217595.56	0.22
3	1.63	3000000	79656433594	892209.16	223052.29	0.22
4	1.65	3000000	81877575473	917087.54	229271.88	0.23
5	1.75	3000000	92734878300	1038697.11	259674.28	0.26
6	1.65	3000000	81877575473	917087.54	229271.88	0.23
7	1.66	3000000	82624743394	925456.36	231364.09	0.23
8	1.67	3000000	83626246294	936673.91	234168.48	0.23
9	1.62	3000000	79411525411	889466.01	222366.50	0.22
10	1.61	3000000	77707726144	870382.24	217595.56	0.22
11	1.62	3000000	78922840261	883992.39	220998.10	0.22
12	1.16	3000000	40591033200	454648.67	113662.17	0.11
13	1.67	3000000	84381332723	945131.41	236282.85	0.24
14	1.68	3000000	84633782344	947959.03	236989.76	0.24
15	1.66	3000000	83124740700	931056.68	232764.17	0.23
16	1.64	3000000	81133801200	908756.73	227189.18	0.23
17	1.62	3000000	79166994300	886727.09	221681.77	0.22
18	1.61	3000000	78192640575	875813.63	218953.41	0.22
19	1.60	3000000	77465834536	867672.88	216918.22	0.22
20	1.55	3000000	72006399394	806523.29	201630.82	0.20
21	1.49	3000000	67195904948	752642.30	188160.58	0.19
22	1.68	3000000	85393393636	956467.22	239116.81	0.24
23	1.71	3000000	87949940948	985102.39	246275.60	0.25
24	1.74	3000000	90805694794	1017088.88	254272.22	0.25
25	1.77	3000000	94506278175	1058538.06	264634.52	0.26
26	1.80	3000000	97465726786	1091686.01	272921.50	0.27
27	1.81	3000000	99099202148	1109982.10	277495.53	0.28
28	1.39	3000000	58004044800	649686.88	162421.72	0.16
29	1.85	3000000	1.02963E+11	1153264.28	288316.07	0.29
30	1.85	3000000	1.03242E+11	1156387.54	289096.88	0.29
31	1.85	3000000	1.02963E+11	1153264.28	288316.07	0.29
Average						0.23

Khepupara

March

2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

month/year	Apr-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.86	3000000	1.04081E+11	1165782.66	291445.66	0.29
2	1.86	3000000	1.03801E+11	1162646.73	290661.68	0.29
3	2.03	3000000	1.23902E+11	1387792.69	346948.17	0.35
4	1.89	3000000	1.0747E+11	1203743.25	300935.81	0.30
5	1.89	3000000	1.0747E+11	1203743.25	300935.81	0.30
6	1.91	3000000	1.10048E+11	1232612.82	308153.21	0.31
7	1.88	3000000	1.06902E+11	1197374.25	299343.56	0.30
8	1.87	3000000	1.05487E+11	1181525.66	295381.42	0.30
9	1.88	3000000	1.06618E+11	1194196.09	298549.02	0.30
10	1.90	3000000	1.08612E+11	1216531.94	304132.98	0.30
11	1.50	3000000	67872937500	760225.55	190056.39	0.19
12	1.92	3000000	1.11203E+11	1245553.55	311388.39	0.31
13	1.91	3000000	1.10048E+11	1232612.82	308153.21	0.31
14	1.89	3000000	1.07755E+11	1206934.09	301733.52	0.30
15	1.87	3000000	1.05769E+11	1184686.93	296171.73	0.30
16	1.86	3000000	1.04081E+11	1165782.66	291445.66	0.29
17	1.85	3000000	1.03522E+11	1159515.02	289878.76	0.29
18	1.87	3000000	1.05205E+11	1178368.62	294592.15	0.29
19	2.06	3000000	1.28426E+11	1438463.13	359615.78	0.36
20	1.99	3000000	1.1886E+11	1331315.44	332828.86	0.33
21	2.02	3000000	1.2248E+11	1371860.80	342965.20	0.34
22	2.05	3000000	1.26772E+11	1419932.40	354983.10	0.35
23	2.07	3000000	1.2957E+11	1451272.70	362818.17	0.36
24	2.08	3000000	1.30823E+11	1465311.53	366327.88	0.37
25	2.09	3000000	1.31137E+11	1468831.79	367207.95	0.37
26	1.65	3000000	81794766300	916160.02	229040.00	0.23
27	2.10	3000000	1.33348E+11	1493591.92	373397.98	0.37
28	2.10	3000000	1.33031E+11	1490042.09	372510.52	0.37
29	2.10	3000000	1.32398E+11	1482955.10	370738.77	0.37
30	2.08	3000000	1.30823E+11	1465311.53	366327.88	0.37
Average						0.32
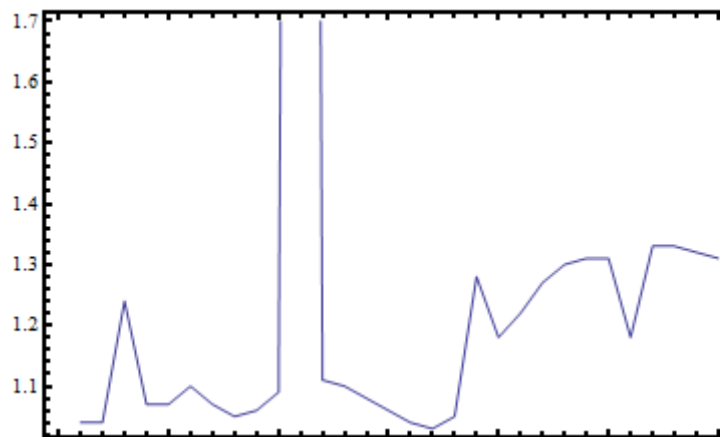
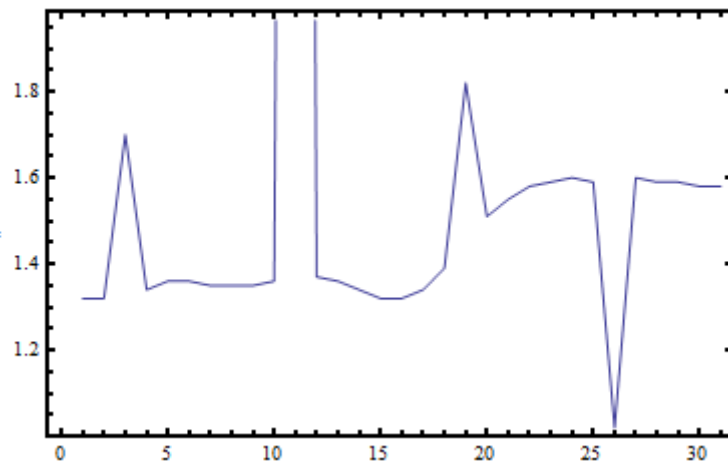Khepupara

April

2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

137

month/year	May-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.09	3000000	1.31452E+11	1472356.28	368089.07	0.37
2	2.09	3000000	1.32082E+11	1479417.93	369854.48	0.37
3	2.37	3000000	1.69915E+11	1903169.30	475792.33	0.48
4	2.11	3000000	1.33665E+11	1497145.97	374286.49	0.37
5	2.13	3000000	1.36217E+11	1525730.45	381432.61	0.38
6	2.12	3000000	1.35897E+11	1522142.61	380535.65	0.38
7	2.11	3000000	1.34619E+11	1507833.48	376958.37	0.38
8	2.11	3000000	1.34619E+11	1507833.48	376958.37	0.38
9	2.12	3000000	1.35577E+11	1518558.99	379639.75	0.38
10	2.13	3000000	1.36217E+11	1525730.45	381432.61	0.38
11	1.78	3000000	95219530575	1066527.00	266631.75	0.27
12	2.14	3000000	1.37502E+11	1540124.06	385031.01	0.39
13	2.13	3000000	1.36217E+11	1525730.45	381432.61	0.38
14	2.11	3000000	1.33665E+11	1497145.97	374286.49	0.37
15	2.10	3000000	1.32398E+11	1482955.10	370738.77	0.37
16	2.10	3000000	1.32398E+11	1482955.10	370738.77	0.37
17	2.11	3000000	1.34301E+11	1504266.75	376066.69	0.38
18	2.15	3000000	1.39117E+11	1558211.09	389552.77	0.39
19	2.46	3000000	1.82551E+11	2044702.65	511175.66	0.51
20	2.24	3000000	1.5136E+11	1695336.77	423834.19	0.42
21	2.27	3000000	1.55099E+11	1737218.87	434304.72	0.43
22	2.29	3000000	1.57847E+11	1767999.56	441999.89	0.44
23	2.30	3000000	1.58884E+11	1779612.00	444903.00	0.44
24	2.30	3000000	1.59577E+11	1787374.75	446843.69	0.45
25	2.30	3000000	1.58884E+11	1779612.00	444903.00	0.44
26	1.85	3000000	1.02871E+11	1152224.13	288056.03	0.29
27	2.30	3000000	1.59924E+11	1791262.46	447815.61	0.45
28	2.30	3000000	1.58884E+11	1779612.00	444903.00	0.44
29	2.29	3000000	1.58538E+11	1775736.96	443934.24	0.44
30	2.29	3000000	1.58192E+11	1771866.15	442966.54	0.44
31	2.29	3000000	1.57502E+11	1764137.19	441034.30	0.44
Average						0.40

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

Khepupara

May

2009

month/year	Jun-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.59	3000000	2.01834E+11	2260689.30	565172.33	0.57
2	2.28	3000000	1.56127E+11	1748729.95	437182.49	0.44
3	2.27	3000000	1.55784E+11	1744888.70	436222.17	0.44
4	2.28	3000000	1.5647E+11	1752575.42	438143.86	0.44
5	2.27	3000000	1.55784E+11	1744888.70	436222.17	0.44
6	2.27	3000000	1.55441E+11	1741051.67	435262.92	0.44
7	2.27	3000000	1.55784E+11	1744888.70	436222.17	0.44
8	2.29	3000000	1.57502E+11	1764137.19	441034.30	0.44
9	2.30	3000000	1.59924E+11	1791262.46	447815.61	0.45
10	1.98	3000000	1.17864E+11	1320160.77	330040.19	0.33
11	2.31	3000000	1.60967E+11	1802950.92	450737.73	0.45
12	2.30	3000000	1.59577E+11	1787374.75	446843.69	0.45
13	2.29	3000000	1.58192E+11	1771866.15	442966.54	0.44
14	2.29	3000000	1.58192E+11	1771866.15	442966.54	0.44
15	2.30	3000000	1.59577E+11	1787374.75	446843.69	0.45
16	2.32	3000000	1.62714E+11	1822516.17	455629.04	0.46
17	2.65	3000000	2.11839E+11	2372748.42	593187.11	0.59
18	2.38	3000000	1.70871E+11	1913876.28	478469.07	0.48
19	2.40	3000000	1.73393E+11	1942124.99	485531.25	0.49
20	2.42	3000000	1.76663E+11	1978748.86	494687.22	0.49
21	2.44	3000000	1.79227E+11	2007470.60	501867.65	0.50
22	2.45	3000000	1.80701E+11	2023975.95	505993.99	0.51
23	2.46	3000000	1.8181E+11	2036399.30	509099.82	0.51
24	2.03	3000000	1.2431E+11	1392361.55	348090.39	0.35
25	2.45	3000000	1.80701E+11	2023975.95	505993.99	0.51
26	2.45	3000000	1.80701E+11	2023975.95	505993.99	0.51
27	2.45	3000000	1.80332E+11	2019843.28	504960.82	0.50
28	2.44	3000000	1.7886E+11	2003354.83	500838.71	0.50
29	2.42	3000000	1.76298E+11	1974662.65	493665.66	0.49
30	2.40	3000000	1.74117E+11	1950234.07	487558.52	0.49
Average						0.47

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

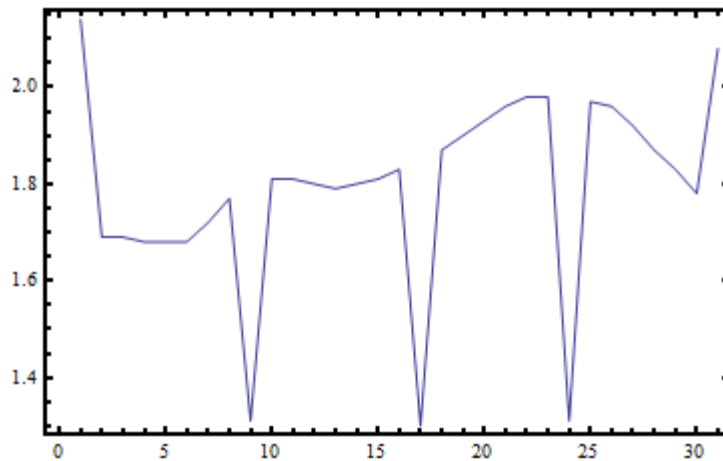| month/year	Jul-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.66	3000000	2.13976E+11	2396685.21	599171.30	0.60
2	2.37	3000000	1.69438E+11	1897827.07	474456.77	0.47
3	2.37	3000000	1.69081E+11	1893825.33	473456.33	0.47
4	2.36	3000000	1.67655E+11	1877860.59	469465.15	0.47
5	2.36	3000000	1.67655E+11	1877860.59	469465.15	0.47
6	2.36	3000000	1.68367E+11	1885834.52	471458.63	0.47
7	2.39	3000000	1.71949E+11	1925957.53	481489.38	0.48
8	2.42	3000000	1.76663E+11	1978748.86	494687.22	0.49
9	2.09	3000000	1.31347E+11	1471180.98	367795.25	0.37
10	2.45	3000000	1.80701E+11	2023975.95	505993.99	0.51
11	2.45	3000000	1.8107E+11	2028112.84	507028.21	0.51
12	2.44	3000000	1.79963E+11	2015714.83	503928.71	0.50
13	2.44	3000000	1.7886E+11	2003354.83	500838.71	0.50
14	2.44	3000000	1.79963E+11	2015714.83	503928.71	0.50
15	2.45	3000000	1.8144E+11	2032253.96	508063.49	0.51
16	2.47	3000000	1.83294E+11	2053022.90	513255.72	0.51
17	2.76	3000000	2.30346E+11	2580040.35	645010.09	0.65
18	2.49	3000000	1.87031E+11	2094877.54	523719.38	0.52
19	2.51	3000000	1.89669E+11	2124427.08	531106.77	0.53
20	2.53	3000000	1.93088E+11	2162723.45	540680.86	0.54
21	2.55	3000000	1.95768E+11	2192746.02	548186.50	0.55
22	2.56	3000000	1.98081E+11	2218644.37	554661.09	0.55
23	2.57	3000000	1.98467E+11	2222975.54	555743.89	0.56
24	2.08	3000000	1.30928E+11	1466484.48	366621.12	0.37
25	2.56	3000000	1.96923E+11	2205676.19	551419.05	0.55
26	2.55	3000000	1.95768E+11	2192746.02	548186.50	0.55
27	2.52	3000000	1.91565E+11	2145660.60	536415.15	0.54
28	2.49	3000000	1.87406E+11	2099086.23	524771.56	0.52
29	2.46	3000000	1.82922E+11	2048860.66	512215.17	0.51
30	2.43	3000000	1.78492E+11	1999243.27	499810.82	0.50
31	2.62	3000000	2.07597E+11	2325235.27	581308.82	0.58
Average						0.51

Khepupara

July

2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=$1\text{x}10^{11}$ J)

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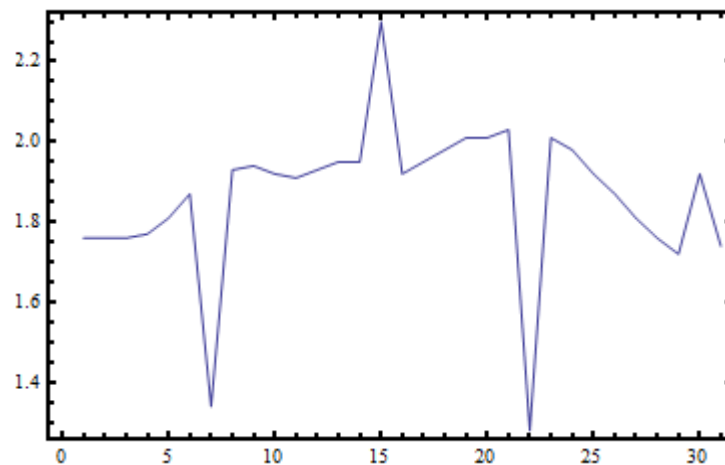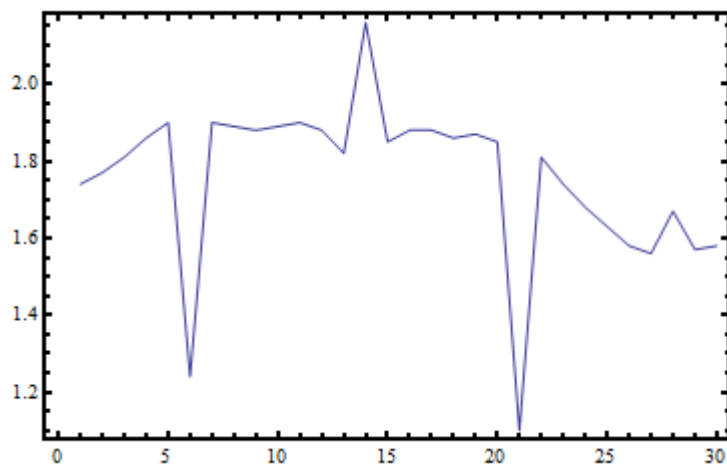| Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
month/year	Aug-09					
1	2.41	3000000	1.75569E+11	1966502.89	491625.72	0.49
2	2.41	3000000	1.75569E+11	1966502.89	491625.72	0.49
3	2.41	3000000	1.75569E+11	1966502.89	491625.72	0.49
4	2.43	3000000	1.77393E+11	1986933.96	496733.49	0.50
5	2.45	3000000	1.8107E+11	2028112.84	507028.21	0.51
6	2.49	3000000	1.87031E+11	2094877.54	523719.38	0.52
7	2.11	3000000	1.34301E+11	1504266.75	376066.69	0.38
8	2.53	3000000	1.92707E+11	2158451.40	539612.85	0.54
9	2.54	3000000	1.93852E+11	2171280.21	542820.05	0.54
10	2.53	3000000	1.92326E+11	2154183.58	538545.89	0.54
11	2.52	3000000	1.90805E+11	2137154.53	534288.63	0.53
12	2.53	3000000	1.92707E+11	2158451.40	539612.85	0.54
13	2.54	3000000	1.94617E+11	2179853.86	544963.47	0.54
14	2.54	3000000	1.94617E+11	2179853.86	544963.47	0.54
15	2.76	3000000	2.30346E+11	2580040.35	645010.09	0.65
16	2.52	3000000	1.91945E+11	2149919.98	537479.99	0.54
17	2.54	3000000	1.94617E+11	2179853.86	544963.47	0.54
18	2.56	3000000	1.97694E+11	2214317.42	553579.35	0.55
19	2.58	3000000	2.01185E+11	2253412.02	563353.00	0.56
20	2.58	3000000	2.01185E+11	2253412.02	563353.00	0.56
21	2.60	3000000	2.03137E+11	2275279.06	568819.77	0.57
22	2.06	3000000	1.27597E+11	1429182.75	357295.69	0.36
23	2.59	3000000	2.01964E+11	2262146.17	565536.54	0.57
24	2.56	3000000	1.98081E+11	2218644.37	554661.09	0.55
25	2.53	3000000	1.92326E+11	2154183.58	538545.89	0.54
26	2.49	3000000	1.86655E+11	2090673.07	522668.27	0.52
27	2.45	3000000	1.8107E+11	2028112.84	507028.21	0.51
28	2.41	3000000	1.75569E+11	1966502.89	491625.72	0.49
29	2.39	3000000	1.7159E+11	1921926.22	480481.56	0.48
30	2.52	3000000	1.92072E+11	2151340.71	537835.18	0.54
31	2.41	3000000	1.74479E+11	1954294.94	488573.73	0.49
Average						0.52

Khepupara

August

2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

month/year	Sep-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.41	3000000	1.74842E+11	1958360.03	489590.01	0.49
2	2.42	3000000	1.76663E+11	1978748.86	494687.22	0.49
3	2.45	3000000	1.80701E+11	2023975.95	505993.99	0.51
4	2.48	3000000	1.85906E+11	2082276.80	520569.20	0.52
5	2.51	3000000	1.90047E+11	2128665.34	532166.34	0.53
6	2.03	3000000	1.24719E+11	1396937.92	349234.48	0.35
7	2.51	3000000	1.90426E+11	2132907.82	533226.96	0.53
8	2.50	3000000	1.88913E+11	2115963.24	528990.81	0.53
9	2.50	3000000	1.87783E+11	2103299.15	525824.79	0.53
10	2.50	3000000	1.88159E+11	2107516.29	526879.07	0.53
11	2.51	3000000	1.89669E+11	2124427.08	531106.77	0.53
12	2.50	3000000	1.88159E+11	2107516.29	526879.07	0.53
13	2.46	3000000	1.8181E+11	2036399.30	509099.82	0.51
14	2.68	3000000	2.16124E+11	2420742.12	605185.53	0.61
15	2.48	3000000	1.84784E+11	2069714.07	517428.52	0.52
16	2.50	3000000	1.87783E+11	2103299.15	525824.79	0.53
17	2.50	3000000	1.88159E+11	2107516.29	526879.07	0.53
18	2.49	3000000	1.8628E+11	2086472.82	521618.21	0.52
19	2.49	3000000	1.87031E+11	2094877.54	523719.38	0.52
20	2.48	3000000	1.85906E+11	2082276.80	520569.20	0.52
21	1.91	3000000	1.10432E+11	1236918.89	309229.72	0.31
22	2.45	3000000	1.80701E+11	2023975.95	505993.99	0.51
23	2.41	3000000	1.74479E+11	1954294.94	488573.73	0.49
24	2.36	3000000	1.68367E+11	1885834.52	471458.63	0.47
25	2.32	3000000	1.62714E+11	1822516.17	455629.04	0.46
26	2.29	3000000	1.57502E+11	1764137.19	441034.30	0.44
27	2.28	3000000	1.5647E+11	1752575.42	438143.86	0.44
28	2.35	3000000	1.67063E+11	1871228.57	467807.14	0.47
29	2.28	3000000	1.57158E+11	1760279.04	440069.76	0.44
30	2.29	3000000	1.57502E+11	1764137.19	441034.30	0.44
Average						0.49

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

Khepupara

September

2009

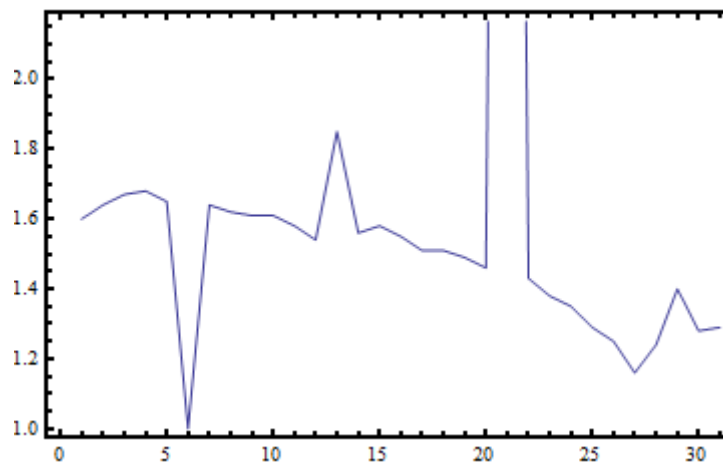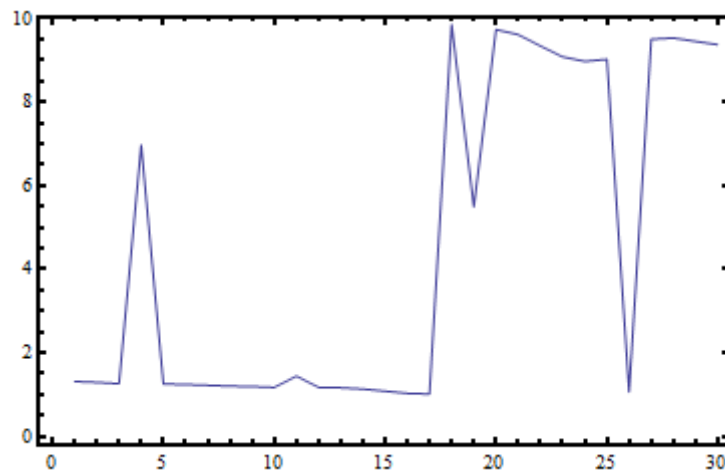| month/year	Oct-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.31	3000000	1.60271E+11	1795154.39	448788.60	0.45
2	2.33	3000000	1.63767E+11	1834306.01	458576.50	0.46
3	2.36	3000000	1.673E+11	1873879.97	468469.99	0.47
4	2.36	3000000	1.68011E+11	1881845.44	470461.36	0.47
5	2.35	3000000	1.65882E+11	1857999.70	464499.93	0.46
6	1.83	3000000	1.00654E+11	1127401.36	281850.34	0.28
7	2.34	3000000	1.64823E+11	1846133.85	461533.46	0.46
8	2.32	3000000	1.62714E+11	1822516.17	455629.04	0.46
9	2.32	3000000	1.61665E+11	1810764.35	452691.09	0.45
10	2.31	3000000	1.61316E+11	1806855.53	451713.88	0.45
11	2.29	3000000	1.58538E+11	1775736.96	443934.24	0.44
12	2.26	3000000	1.54075E+11	1725745.80	431436.45	0.43
13	2.48	3000000	1.85531E+11	2078085.00	519521.25	0.52
14	2.28	3000000	1.5647E+11	1752575.42	438143.86	0.44
15	2.29	3000000	1.58538E+11	1775736.96	443934.24	0.44
16	2.27	3000000	1.55099E+11	1737218.87	434304.72	0.43
17	2.24	3000000	1.5136E+11	1695336.77	423834.19	0.42
18	2.24	3000000	1.5136E+11	1695336.77	423834.19	0.42
19	2.23	3000000	1.49339E+11	1672707.39	418176.85	0.42
20	2.21	3000000	1.46667E+11	1642771.40	410692.85	0.41
21	1.66	3000000	82791241575	927321.25	231830.31	0.23
22	2.18	3000000	1.4336E+11	1605731.52	401432.88	0.40
23	2.14	3000000	1.3847E+11	1550963.61	387740.90	0.39
24	2.12	3000000	1.35897E+11	1522142.61	380535.65	0.38
25	2.07	3000000	1.2957E+11	1451272.70	362818.17	0.36
26	2.04	3000000	1.25538E+11	1406113.19	351528.30	0.35
27	1.97	3000000	1.16773E+11	1307944.84	326986.21	0.33
28	2.03	3000000	1.24004E+11	1388934.20	347233.55	0.35
29	2.16	3000000	1.40741E+11	1576403.71	394100.93	0.39
30	2.07	3000000	1.28634E+11	1440787.92	360196.98	0.36
31	2.08	3000000	1.29882E+11	1454776.07	363694.02	0.36
Average						0.41

Khepupara

October

2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

month/year	Nov-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.09	3000000	1.31137E+11	1468831.79	367207.95	0.37
2	2.07	3000000	1.2957E+11	1451272.70	362818.17	0.36
3	2.05	3000000	1.26772E+11	1419932.40	354983.10	0.35
4	1.52	3000000	69694948800	780633.39	195158.35	0.20
5	2.04	3000000	1.2523E+11	1402668.94	350667.24	0.35
6	2.03	3000000	1.24004E+11	1388934.20	347233.55	0.35
7	2.02	3000000	1.22784E+11	1375267.03	343816.76	0.34
8	2.00	3000000	1.20663E+11	1351512.10	337878.02	0.34
9	1.99	3000000	1.19159E+11	1334670.99	333667.75	0.33
10	1.98	3000000	1.17665E+11	1317935.47	329483.87	0.33
11	2.19	3000000	1.44238E+11	1615567.53	403891.88	0.40
12	1.97	3000000	1.1707E+11	1311270.82	327817.71	0.33
13	1.97	3000000	1.16773E+11	1307944.84	326986.21	0.33
14	1.94	3000000	1.13532E+11	1271637.73	317909.43	0.32
15	1.89	3000000	1.0804E+11	1210129.15	302532.29	0.30
16	1.86	3000000	1.03801E+11	1162646.73	290661.68	0.29
17	1.83	3000000	1.01298E+11	1134613.41	283653.35	0.28
18	1.81	3000000	98553202073	1103866.51	275966.63	0.28
19	1.35	3000000	54977079375	615782.70	153945.67	0.15
20	1.80	3000000	97737030000	1094724.80	273681.20	0.27
21	1.79	3000000	96114866794	1076555.41	269138.85	0.27
22	1.76	3000000	93441427200	1046610.97	261652.74	0.26
23	1.74	3000000	90805694794	1017088.88	254272.22	0.25
24	1.73	3000000	89761959844	1005398.30	251349.57	0.25
25	1.73	3000000	90283073175	1011235.14	252808.78	0.25
26	1.88	3000000	1.0624E+11	1189965.11	297491.28	0.30
27	1.78	3000000	95040966094	1064526.95	266131.74	0.27
28	1.78	3000000	95308875661	1067527.73	266881.93	0.27
29	1.77	3000000	94506278175	1058538.06	264634.52	0.26
30	1.76	3000000	93707074336	1049586.41	262396.60	0.26
Average						0.30

Khepupara

November

2009

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

month/year	Dec-09					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.75	3000000	91855462894	1028847.03	257211.76	0.26
2	1.73	3000000	89761959844	1005398.30	251349.57	0.25
3	1.21	3000000	44165674575	494687.22	123671.80	0.12
4	1.71	3000000	88207669575	987989.13	246997.28	0.25
5	1.71	3000000	87949940948	985102.39	246275.60	0.25
6	1.70	3000000	87435614911	979341.56	244835.39	0.24
7	1.70	3000000	86922797161	973597.64	243399.41	0.24
8	1.69	3000000	86156398575	965013.42	241253.36	0.24
9	1.68	3000000	84886609036	950790.87	237697.72	0.24
10	1.88	3000000	1.0624E+11	1189965.11	297491.28	0.30
11	1.65	3000000	81877575473	917087.54	229271.88	0.23
12	1.64	3000000	80639837044	903223.98	225806.00	0.23
13	1.61	3000000	78435663398	878535.66	219633.91	0.22
14	1.55	3000000	72707187473	814372.62	203593.15	0.20
15	1.52	3000000	69694948800	780633.39	195158.35	0.20
16	1.50	3000000	67646882911	757693.58	189423.40	0.19
17	1.06	3000000	34107743175	382031.17	95507.79	0.10
18	1.50	3000000	67646882911	757693.58	189423.40	0.19
19	1.50	3000000	67421205394	755165.83	188791.46	0.19
20	1.50	3000000	68099369161	762761.75	190690.44	0.19
21	1.50	3000000	67872937500	760225.55	190056.39	0.19
22	1.49	3000000	66970981575	750123.00	187530.75	0.19
23	1.49	3000000	66522266044	745097.07	186274.27	0.19
24	1.49	3000000	66522266044	745097.07	186274.27	0.19
25	1.49	3000000	67195904948	752642.30	188160.58	0.19
26	1.53	3000000	70615004175	790938.67	197734.67	0.20
27	1.53	3000000	70615004175	790938.67	197734.67	0.20
28	1.52	3000000	69924397036	783203.37	195800.84	0.20
29	1.52	3000000	69924397036	783203.37	195800.84	0.20
30	1.52	3000000	69237183544	775506.09	193876.52	0.19
31	1.50	3000000	67646882911	757693.58	189423.40	0.19
Average						0.21

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

Khepupara

December

2009

CIII: Calculation for Khepupara during Year 2005

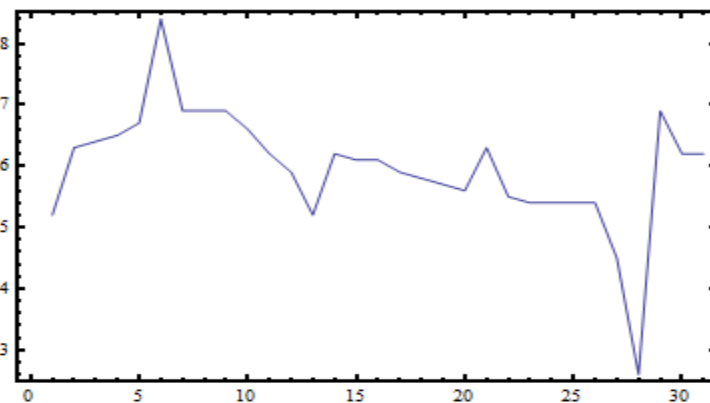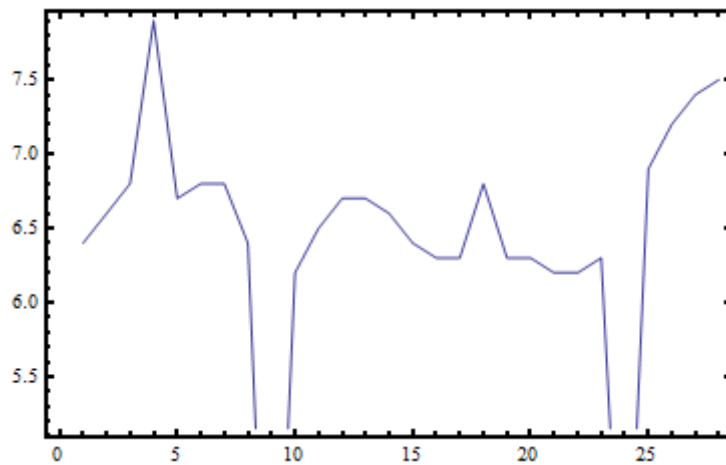| month/year	Jan-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.44	3000000	62769081136	703058.70	175764.68	0.18
2	1.45	3000000	63642379598	712840.27	178210.07	0.18
3	1.47	3000000	64963639448	727639.33	181909.83	0.18
4	1.49	3000000	67195904948	752642.30	188160.58	0.19
5	1.65	3000000	82126254375	919872.92	229968.23	0.23
6	1.52	3000000	69237183544	775506.09	193876.52	0.19
7	1.51	3000000	68553363698	767846.82	191961.70	0.19
8	1.50	3000000	68099369161	762761.75	190690.44	0.19
9	1.48	3000000	66298473886	742590.43	185647.61	0.19
10	1.46	3000000	64081291261	717756.40	179439.10	0.18
11	0.93	3000000	26277720000	294329.30	73582.33	0.07
12	1.43	3000000	61255326094	686103.56	171525.89	0.17
13	1.44	3000000	62551699200	700623.87	175155.97	0.18
14	1.45	3000000	63423489375	710388.55	177597.14	0.18
15	1.46	3000000	63861646894	715296.22	178824.06	0.18
16	1.45	3000000	63423489375	710388.55	177597.14	0.18
17	1.44	3000000	62118066544	695766.87	173941.72	0.17
18	1.42	3000000	61040583661	683698.29	170924.57	0.17
19	1.53	3000000	70615004175	790938.67	197734.67	0.20
20	1.39	3000000	58073782148	650467.99	162617.00	0.16
21	1.37	3000000	56618096175	634163.26	158540.82	0.16
22	1.36	3000000	55385071144	620352.50	155088.12	0.16
23	1.34	3000000	53762153794	602174.66	150543.67	0.15
24	1.33	3000000	53159781473	595427.66	148856.91	0.15
25	0.93	3000000	26090357175	292230.70	73057.68	0.07
26	1.34	3000000	53762153794	602174.66	150543.67	0.15
27	1.37	3000000	56618096175	634163.26	158540.82	0.16
28	1.40	3000000	58913898286	659877.89	164969.47	0.16
29	1.41	3000000	60185384648	674119.45	168529.86	0.17
30	1.42	3000000	60826218300	681297.25	170324.31	0.17
31	1.43	3000000	61470445598	688513.06	172128.26	0.17
Average						0.17

Khepupara

January

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

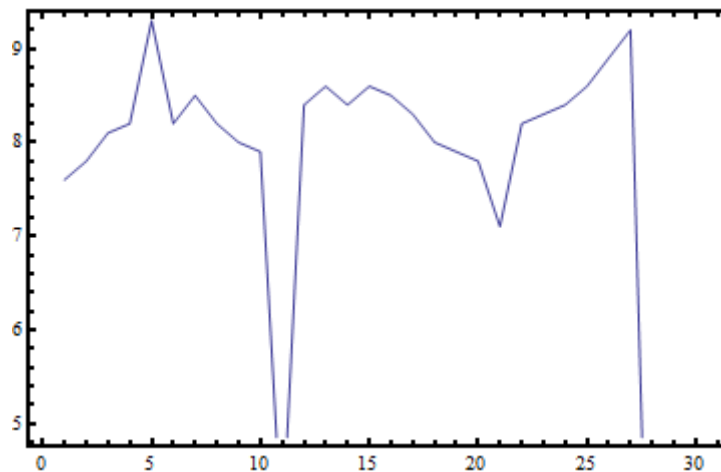| month/year	Feb-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.45	3000000	63642379598	712840.27	178210.07	0.18
2	1.48	3000000	66075058800	740088.02	185022.01	0.19
3	1.51	3000000	68326177894	765302.17	191325.54	0.19
4	1.62	3000000	79166994300	886727.09	221681.77	0.22
5	1.50	3000000	67421205394	755165.83	188791.46	0.19
6	1.51	3000000	68326177894	765302.17	191325.54	0.19
7	1.49	3000000	66746435273	747607.92	186901.98	0.19
8	1.46	3000000	64081291261	717756.40	179439.10	0.18
9	0.93	3000000	26277720000	294329.30	73582.33	0.07
10	1.43	3000000	61901815823	693344.71	173336.18	0.17
11	1.46	3000000	64521711211	722689.42	180672.35	0.18
12	1.49	3000000	66522266044	745097.07	186274.27	0.19
13	1.49	3000000	67195904948	752642.30	188160.58	0.19
14	1.48	3000000	66075058800	740088.02	185022.01	0.19
15	1.46	3000000	64301312700	720220.80	180055.20	0.18
16	1.44	3000000	62769081136	703058.70	175764.68	0.18
17	1.45	3000000	63204976223	707941.04	176985.26	0.18
18	1.50	3000000	68174930175	763608.09	190902.02	0.19
19	1.44	3000000	62769081136	703058.70	175764.68	0.18
20	1.45	3000000	62986840144	705497.76	176374.44	0.18
21	1.44	3000000	62334694336	698193.26	174548.32	0.17
22	1.44	3000000	62118066544	695766.87	173941.72	0.17
23	1.45	3000000	63423489375	710388.55	177597.14	0.18
24	1.04	3000000	32836759575	367795.25	91948.81	0.09
25	1.51	3000000	68780926575	770395.68	192598.92	0.19
26	1.55	3000000	72006399394	806523.29	201630.82	0.20
27	1.57	3000000	74118944573	830185.31	207546.33	0.21
28	1.58	3000000	74829913594	838148.67	209537.17	0.21
Average						0.18

Khepupara

February

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

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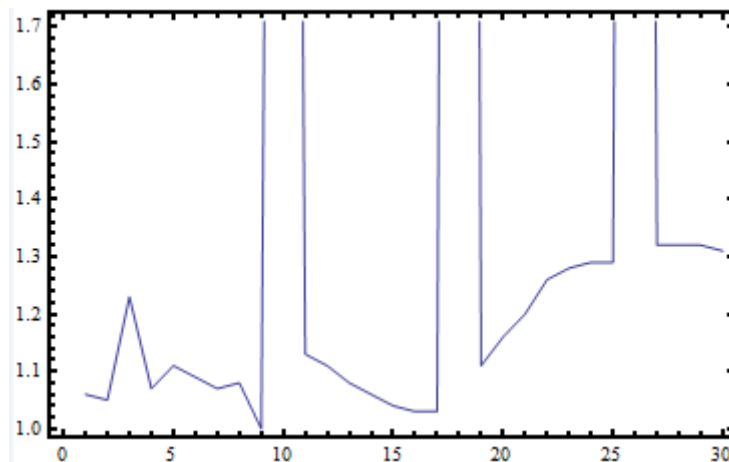| month/year	Mar-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.59	3000000	75783151294	848825.62	212206.40	0.21
2	1.61	3000000	78192640575	875813.63	218953.41	0.22
3	1.64	3000000	81381348886	911529.45	227882.36	0.23
4	1.65	3000000	82375310348	922662.53	230665.63	0.23
5	1.76	3000000	93795707175	1050579.16	262644.79	0.26
6	1.65	3000000	82126254375	919872.92	229968.23	0.23
7	1.68	3000000	85139812800	953626.94	238406.73	0.24
8	1.65	3000000	82375310348	922662.53	230665.63	0.23
9	1.63	3000000	79901718848	894956.53	223739.13	0.22
10	1.62	3000000	79411525411	889466.01	222366.50	0.22
11	1.13	3000000	38291732700	428894.86	107223.71	0.11
12	1.67	3000000	84129260175	942308.02	235577.01	0.24
13	1.69	3000000	85901686523	962160.47	240540.12	0.24
14	1.68	3000000	84886609036	950790.87	237697.72	0.24
15	1.66	3000000	82874553511	928254.41	232063.60	0.23
16	1.63	3000000	80393420573	900463.94	225115.99	0.23
17	1.62	3000000	79166994300	886727.09	221681.77	0.22
18	1.61	3000000	77949994823	873095.82	218273.96	0.22
19	1.54	3000000	71541092700	801311.52	200327.88	0.20
20	1.65	3000000	81877575473	917087.54	229271.88	0.23
21	1.66	3000000	83124740700	931056.68	232764.17	0.23
22	1.67	3000000	84381332723	945131.41	236282.85	0.24
23	1.69	3000000	86156398575	965013.42	241253.36	0.24
24	1.72	3000000	89242354800	999578.35	249894.59	0.25
25	1.76	3000000	92911264144	1040672.76	260168.19	0.26
26	1.79	3000000	96114866794	1076555.41	269138.85	0.27
27	1.37	3000000	56618096175	634163.26	158540.82	0.16
28	1.83	3000000	1.00746E+11	1128430.24	282107.56	0.28
29	1.83	3000000	1.01298E+11	1134613.41	283653.35	0.28
30	1.84	3000000	1.02129E+11	1143919.84	285979.96	0.29
31	1.86	3000000	1.03801E+11	1162646.73	290661.68	0.29
Average						0.23

	Khepupara March 2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)

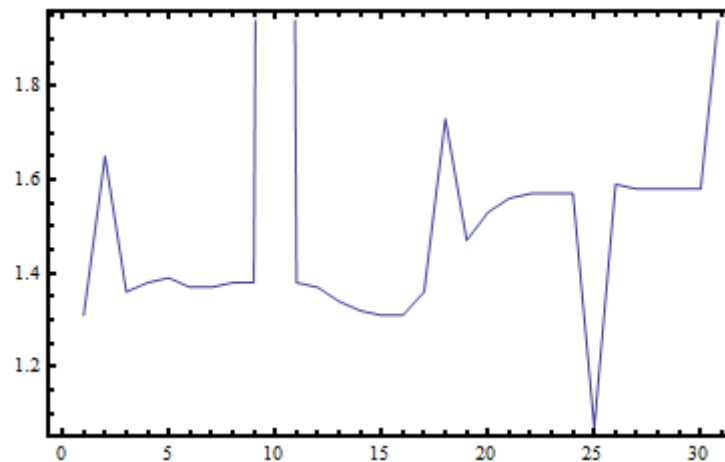| month/year	Apr-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.87	3000000	1.05769E+11	1184686.93	296171.73	0.30
2	1.87	3000000	1.05205E+11	1178368.62	294592.15	0.29
3	2.03	3000000	1.23902E+11	1387792.69	346948.17	0.35
4	1.89	3000000	1.07755E+11	1206934.09	301733.52	0.30
5	1.92	3000000	1.11203E+11	1245553.55	311388.39	0.31
6	1.91	3000000	1.09472E+11	1226167.80	306541.95	0.31
7	1.89	3000000	1.07186E+11	1200556.64	300139.16	0.30
8	1.89	3000000	1.07755E+11	1206934.09	301733.52	0.30
9	1.91	3000000	1.10048E+11	1232612.82	308153.21	0.31
10	1.46	3000000	64301312700	720220.80	180055.20	0.18
11	1.94	3000000	1.13239E+11	1268362.43	317090.61	0.32
12	1.92	3000000	1.11203E+11	1245553.55	311388.39	0.31
13	1.90	3000000	1.08612E+11	1216531.94	304132.98	0.30
14	1.88	3000000	1.06902E+11	1197374.25	299343.56	0.30
15	1.86	3000000	1.04642E+11	1172067.19	293016.80	0.29
16	1.85	3000000	1.03242E+11	1156387.54	289096.88	0.29
17	1.85	3000000	1.03242E+11	1156387.54	289096.88	0.29
18	1.73	3000000	90544195448	1014159.90	253539.97	0.25
19	1.92	3000000	1.11493E+11	1248799.29	312199.82	0.31
20	1.96	3000000	1.16181E+11	1301305.53	325326.38	0.33
21	2.00	3000000	1.20965E+11	1354892.99	338723.25	0.34
22	2.04	3000000	1.25538E+11	1406113.19	351528.30	0.35
23	2.06	3000000	1.28011E+11	1433819.18	358454.80	0.36
24	2.07	3000000	1.28945E+11	1444278.62	361069.66	0.36
25	2.07	3000000	1.28945E+11	1444278.62	361069.66	0.36
26	1.66	3000000	83458910175	934799.62	233699.91	0.23
27	2.09	3000000	1.32082E+11	1479417.93	369854.48	0.37
28	2.09	3000000	1.31767E+11	1475885.00	368971.25	0.37
29	2.09	3000000	1.31767E+11	1475885.00	368971.25	0.37
30	2.09	3000000	1.31452E+11	1472356.28	368089.07	0.37
Average						0.31

Khepupara

April

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

month/year	May-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.09	3000000	1.31452E+11	1472356.28	368089.07	0.37
2	2.34	3000000	1.65176E+11	1850084.91	462521.23	0.46
3	2.12	3000000	1.35577E+11	1518558.99	379639.75	0.38
4	2.14	3000000	1.37502E+11	1540124.06	385031.01	0.39
5	2.15	3000000	1.39117E+11	1558211.09	389552.77	0.39
6	2.13	3000000	1.36859E+11	1532918.81	383229.70	0.38
7	2.13	3000000	1.36859E+11	1532918.81	383229.70	0.38
8	2.14	3000000	1.37824E+11	1543733.02	385933.25	0.39
9	2.14	3000000	1.38147E+11	1547346.20	386836.55	0.39
10	1.75	3000000	92382609375	1034751.45	258687.86	0.26
11	2.14	3000000	1.38147E+11	1547346.20	386836.55	0.39
12	2.13	3000000	1.36538E+11	1529322.52	382330.63	0.38
13	2.11	3000000	1.33983E+11	1500704.25	375176.06	0.38
14	2.09	3000000	1.32082E+11	1479417.93	369854.48	0.37
15	2.08	3000000	1.30823E+11	1465311.53	366327.88	0.37
16	2.09	3000000	1.31137E+11	1468831.79	367207.95	0.37
17	2.12	3000000	1.35577E+11	1518558.99	379639.75	0.38
18	2.39	3000000	1.72791E+11	1935380.34	483845.08	0.48
19	2.22	3000000	1.48669E+11	1665198.05	416299.51	0.42
20	2.25	3000000	1.52714E+11	1710507.50	427626.87	0.43
21	2.28	3000000	1.56127E+11	1748729.95	437182.49	0.44
22	2.28	3000000	1.57158E+11	1760279.04	440069.76	0.44
23	2.28	3000000	1.57158E+11	1760279.04	440069.76	0.44
24	2.28	3000000	1.57158E+11	1760279.04	440069.76	0.44
25	1.88	3000000	1.06618E+11	1194196.09	298549.02	0.30
26	2.30	3000000	1.5923E+11	1783491.26	445872.82	0.45
27	2.29	3000000	1.58538E+11	1775736.96	443934.24	0.44
28	2.29	3000000	1.57502E+11	1764137.19	441034.30	0.44
29	2.29	3000000	1.57502E+11	1764137.19	441034.30	0.44
30	2.29	3000000	1.57847E+11	1767999.56	441999.89	0.44
31	2.59	3000000	2.02876E+11	2272357.36	568089.34	0.57
Average						0.41

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

Khepupara

May

2005

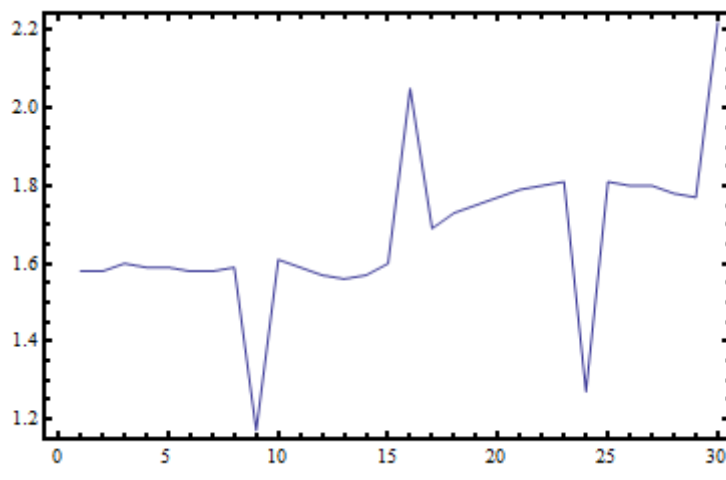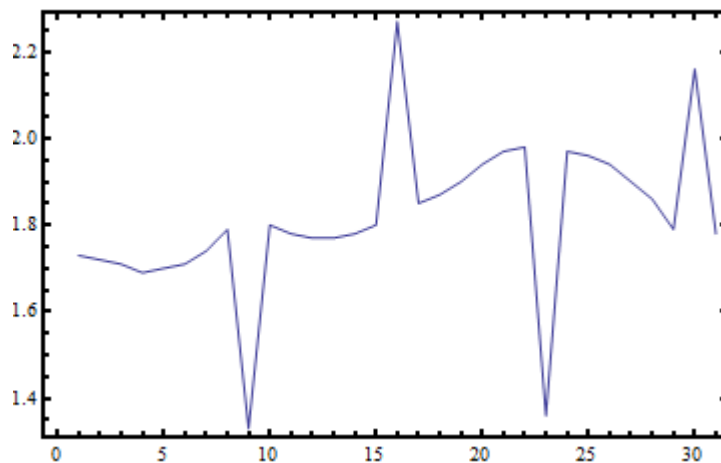| month/year	Jun-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.29	3000000	1.58192E+11	1771866.15	442966.54	0.44
2	2.29	3000000	1.58538E+11	1775736.96	443934.24	0.44
3	2.31	3000000	1.60271E+11	1795154.39	448788.60	0.45
4	2.30	3000000	1.5923E+11	1783491.26	445872.82	0.45
5	2.29	3000000	1.58538E+11	1775736.96	443934.24	0.44
6	2.29	3000000	1.57847E+11	1767999.56	441999.89	0.44
7	2.29	3000000	1.58192E+11	1771866.15	442966.54	0.44
8	2.30	3000000	1.5923E+11	1783491.26	445872.82	0.45
9	1.97	3000000	1.1707E+11	1311270.82	327817.71	0.33
10	2.31	3000000	1.60619E+11	1799050.55	449762.64	0.45
11	2.30	3000000	1.5923E+11	1783491.26	445872.82	0.45
12	2.28	3000000	1.57158E+11	1760279.04	440069.76	0.44
13	2.28	3000000	1.5647E+11	1752575.42	438143.86	0.44
14	2.28	3000000	1.56814E+11	1756425.12	439106.28	0.44
15	2.30	3000000	1.59577E+11	1787374.75	446843.69	0.45
16	2.61	3000000	2.04968E+11	2295783.57	573945.89	0.57
17	2.37	3000000	1.68724E+11	1889827.81	472456.95	0.47
18	2.39	3000000	1.7267E+11	1934032.82	483508.20	0.48
19	2.41	3000000	1.75206E+11	1962429.35	490607.34	0.49
20	2.42	3000000	1.77028E+11	1982839.30	495709.82	0.50
21	2.44	3000000	1.7886E+11	2003354.83	500838.71	0.50
22	2.44	3000000	1.79963E+11	2015714.83	503928.71	0.50
23	2.45	3000000	1.80701E+11	2023975.95	505993.99	0.51
24	2.05	3000000	1.27184E+11	1424553.82	356138.45	0.36
25	2.45	3000000	1.80701E+11	2023975.95	505993.99	0.51
26	2.45	3000000	1.80332E+11	2019843.28	504960.82	0.50
27	2.44	3000000	1.79595E+11	2011590.60	502897.65	0.50
28	2.43	3000000	1.78126E+11	1995135.95	498783.99	0.50
29	2.42	3000000	1.76663E+11	1978748.86	494687.22	0.49
30	2.71	3000000	2.22086E+11	2487518.08	621879.52	0.62
Average						0.47

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

month/year	Jul-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.40	3000000	1.73031E+11	1938076.79	484519.20	0.48
2	2.39	3000000	1.71949E+11	1925957.53	481489.38	0.48
3	2.38	3000000	1.7123E+11	1917899.14	479474.79	0.48
4	2.37	3000000	1.69438E+11	1897827.07	474456.77	0.47
5	2.37	3000000	1.69796E+11	1901833.04	475458.26	0.48
6	2.38	3000000	1.7123E+11	1917899.14	479474.79	0.48
7	2.41	3000000	1.74479E+11	1954294.94	488573.73	0.49
8	2.44	3000000	1.7886E+11	2003354.83	500838.71	0.50
9	2.10	3000000	1.33031E+11	1490042.09	372510.52	0.37
10	2.44	3000000	1.79963E+11	2015714.83	503928.71	0.50
11	2.43	3000000	1.78126E+11	1995135.95	498783.99	0.50
12	2.42	3000000	1.77028E+11	1982839.30	495709.82	0.50
13	2.42	3000000	1.77028E+11	1982839.30	495709.82	0.50
14	2.43	3000000	1.78492E+11	1999243.27	499810.82	0.50
15	2.45	3000000	1.80332E+11	2019843.28	504960.82	0.50
16	2.74	3000000	2.27024E+11	2542828.71	635707.18	0.64
17	2.48	3000000	1.85158E+11	2073897.42	518474.36	0.52
18	2.49	3000000	1.87406E+11	2099086.23	524771.56	0.52
19	2.52	3000000	1.90805E+11	2137154.53	534288.63	0.53
20	2.54	3000000	1.94234E+11	2175564.92	543891.23	0.54
21	2.56	3000000	1.96923E+11	2205676.19	551419.05	0.55
22	2.56	3000000	1.98081E+11	2218644.37	554661.09	0.55
23	2.13	3000000	1.36431E+11	1528124.69	382031.17	0.38
24	2.55	3000000	1.96538E+11	2201361.91	550340.48	0.55
25	2.55	3000000	1.96153E+11	2197051.85	549262.96	0.55
26	2.54	3000000	1.94234E+11	2175564.92	543891.23	0.54
27	2.51	3000000	1.90426E+11	2132907.82	533226.96	0.53
28	2.49	3000000	1.8628E+11	2086472.82	521618.21	0.52
29	2.44	3000000	1.79227E+11	2007470.60	501867.65	0.50
30	2.68	3000000	2.16662E+11	2426775.12	606693.78	0.61
31	2.43	3000000	1.78126E+11	1995135.95	498783.99	0.50
Average						0.51

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{11} J)

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July

2005

month/year	Aug-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.42	3000000	1.76298E+11	1974662.65	493665.66	0.49
2	2.41	3000000	1.75569E+11	1966502.89	491625.72	0.49
3	2.42	3000000	1.75933E+11	1970580.66	492645.16	0.49
4	2.43	3000000	1.78492E+11	1999243.27	499810.82	0.50
5	2.47	3000000	1.83666E+11	2057189.36	514297.34	0.51
6	2.46	3000000	1.8181E+11	2036399.30	509099.82	0.51
7	2.13	3000000	1.36859E+11	1532918.81	383229.70	0.38
8	2.53	3000000	1.92707E+11	2158451.40	539612.85	0.54
9	2.52	3000000	1.90805E+11	2137154.53	534288.63	0.53
10	2.51	3000000	1.89291E+11	2120193.05	530048.26	0.53
11	2.51	3000000	1.89669E+11	2124427.08	531106.77	0.53
12	2.52	3000000	1.91185E+11	2141405.45	535351.36	0.54
13	2.53	3000000	1.92707E+11	2158451.40	539612.85	0.54
14	2.52	3000000	1.90805E+11	2137154.53	534288.63	0.53
15	2.75	3000000	2.28128E+11	2555202.56	638800.64	0.64
16	2.53	3000000	1.92707E+11	2158451.40	539612.85	0.54
17	2.56	3000000	1.96923E+11	2205676.19	551419.05	0.55
18	2.58	3000000	2.00406E+11	2244694.77	561173.69	0.56
19	2.59	3000000	2.02746E+11	2270897.21	567724.30	0.57
20	2.60	3000000	2.0392E+11	2284055.44	571013.86	0.57
21	2.10	3000000	1.33454E+11	1494776.13	373694.03	0.37
22	2.59	3000000	2.02746E+11	2270897.21	567724.30	0.57
23	2.58	3000000	2.01185E+11	2253412.02	563353.00	0.56
24	2.55	3000000	1.96538E+11	2201361.91	550340.48	0.55
25	2.51	3000000	1.90047E+11	2128665.34	532166.34	0.53
26	2.47	3000000	1.84411E+11	2065534.94	516383.74	0.52
27	2.44	3000000	1.7886E+11	2003354.83	500838.71	0.50
28	2.41	3000000	1.74842E+11	1958360.03	489590.01	0.49
29	2.54	3000000	1.94617E+11	2179853.86	544963.47	0.54
30	2.41	3000000	1.74479E+11	1954294.94	488573.73	0.49
31	2.40	3000000	1.74117E+11	1950234.07	487558.52	0.49
Average						0.52

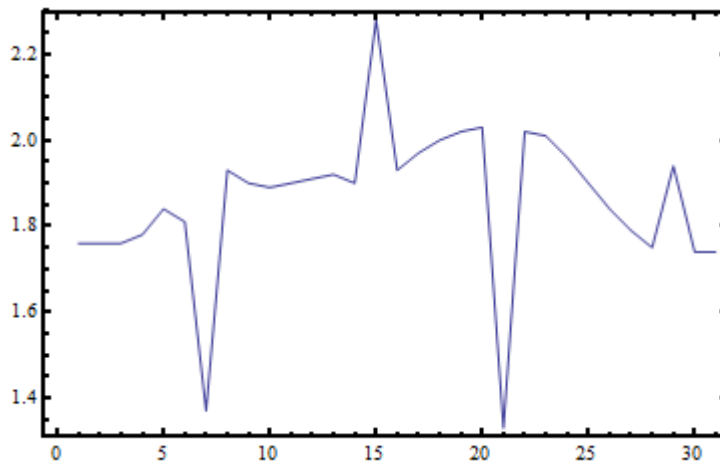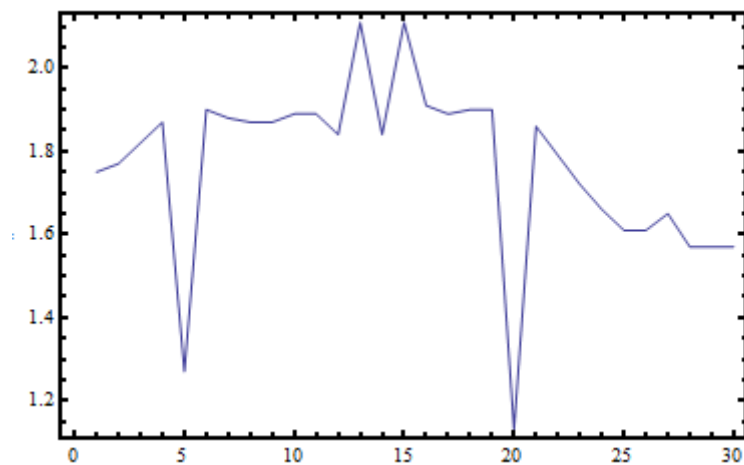Khepupara

August

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

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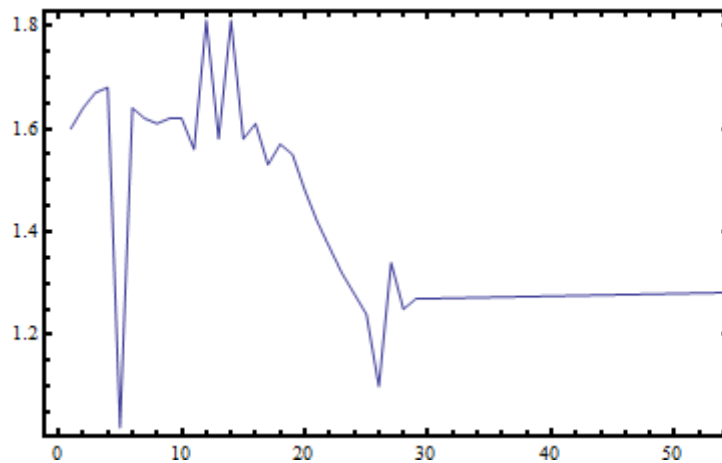| month/year	Sep-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.41	3000000	1.74842E+11	1958360.03	489590.01	0.49
2	2.42	3000000	1.77028E+11	1982839.30	495709.82	0.50
3	2.46	3000000	1.8218E+11	2040548.86	510137.22	0.51
4	2.49	3000000	1.87406E+11	2099086.23	524771.56	0.52
5	2.05	3000000	1.26772E+11	1419932.40	354983.10	0.35
6	2.51	3000000	1.90047E+11	2128665.34	532166.34	0.53
7	2.50	3000000	1.88536E+11	2111737.65	527934.41	0.53
8	2.49	3000000	1.86655E+11	2090673.07	522668.27	0.52
9	2.49	3000000	1.87406E+11	2099086.23	524771.56	0.52
10	2.51	3000000	1.89291E+11	2120193.05	530048.26	0.53
11	2.50	3000000	1.88913E+11	2115963.24	528990.81	0.53
12	2.47	3000000	1.84411E+11	2065534.94	516383.74	0.52
13	2.64	3000000	2.10774E+11	2360825.08	590206.27	0.59
14	2.47	3000000	1.84411E+11	2065534.94	516383.74	0.52
15	2.50	3000000	1.88536E+11	2111737.65	527934.41	0.53
16	2.52	3000000	1.91185E+11	2141405.45	535351.36	0.54
17	2.51	3000000	1.89669E+11	2124427.08	531106.77	0.53
18	2.51	3000000	1.90426E+11	2132907.82	533226.96	0.53
19	2.51	3000000	1.90426E+11	2132907.82	533226.96	0.53
20	1.94	3000000	1.13532E+11	1271637.73	317909.43	0.32
21	2.48	3000000	1.85906E+11	2082276.80	520569.20	0.52
22	2.44	3000000	1.79595E+11	2011590.60	502897.65	0.50
23	2.39	3000000	1.71949E+11	1925957.53	481489.38	0.48
24	2.35	3000000	1.6659E+11	1865931.39	466482.85	0.47
25	2.31	3000000	1.61316E+11	1806855.53	451713.88	0.45
26	2.31	3000000	1.60619E+11	1799050.55	449762.64	0.45
27	2.34	3000000	1.65176E+11	1850084.91	462521.23	0.46
28	2.28	3000000	1.57158E+11	1760279.04	440069.76	0.44
29	2.28	3000000	1.56814E+11	1756425.12	439106.28	0.44
30	2.29	3000000	1.57502E+11	1764137.19	441034.30	0.44
Average						0.49

Khepupara

September

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

month/year	Oct-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.31	3000000	1.60271E+11	1795154.39	448788.60	0.45
2	2.34	3000000	1.6447E+11	1842187.01	460546.75	0.46
3	2.36	3000000	1.673E+11	1873879.97	468469.99	0.47
4	2.36	3000000	1.67655E+11	1877860.59	469465.15	0.47
5	1.83	3000000	1.0139E+11	1135645.58	283911.40	0.28
6	2.34	3000000	1.6447E+11	1842187.01	460546.75	0.46
7	2.32	3000000	1.62014E+11	1814677.40	453669.35	0.45
8	2.32	3000000	1.61665E+11	1810764.35	452691.09	0.45
9	2.32	3000000	1.62714E+11	1822516.17	455629.04	0.46
10	2.32	3000000	1.61665E+11	1810764.35	452691.09	0.45
11	2.28	3000000	1.56127E+11	1748729.95	437182.49	0.44
12	2.45	3000000	1.8107E+11	2028112.84	507028.21	0.51
13	2.29	3000000	1.58192E+11	1771866.15	442966.54	0.44
14	2.31	3000000	1.61316E+11	1806855.53	451713.88	0.45
15	2.25	3000000	1.53054E+11	1714310.74	428577.68	0.43
16	2.28	3000000	1.57158E+11	1760279.04	440069.76	0.44
17	2.27	3000000	1.54757E+11	1733390.29	433347.57	0.43
18	2.26	3000000	1.53394E+11	1718118.20	429529.55	0.43
19	1.67	3000000	84129260175	942308.02	235577.01	0.24
20	2.22	3000000	1.48669E+11	1665198.05	416299.51	0.42
21	2.17	3000000	1.42375E+11	1594701.92	398675.48	0.40
22	2.13	3000000	1.3718E+11	1536519.32	384129.83	0.38
23	2.10	3000000	1.32398E+11	1482955.10	370738.77	0.37
24	2.06	3000000	1.28011E+11	1433819.18	358454.80	0.36
25	2.03	3000000	1.24004E+11	1388934.20	347233.55	0.35
26	1.92	3000000	1.10625E+11	1239074.74	309768.68	0.31
27	2.11	3000000	1.33877E+11	1499517.69	374879.42	0.37
28	2.04	3000000	1.25538E+11	1406113.19	351528.30	0.35
29	2.06	3000000	1.27701E+11	1430341.15	357585.29	0.36
30	2.08	3000000	1.29882E+11	1454776.07	363694.02	0.36
31	2.09	3000000	1.31452E+11	1472356.28	368089.07	0.37
Average						0.41

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{11} J)

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October

2005

month/year	Nov-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	2.08	3000000	1.30509E+11	1461795.48	365448.87	0.37
2	2.06	3000000	1.28322E+11	1437301.44	359325.36	0.36
3	1.52	3000000	69694948800	780633.39	195158.35	0.20
4	2.04	3000000	1.25846E+11	1409561.65	352390.41	0.35
5	2.03	3000000	1.2431E+11	1392361.55	348090.39	0.35
6	2.02	3000000	1.22784E+11	1375267.03	343816.76	0.34
7	2.01	3000000	1.2157E+11	1361667.44	340416.86	0.34
8	2.00	3000000	1.2006E+11	1344762.98	336190.75	0.34
9	1.99	3000000	1.19159E+11	1334670.99	333667.75	0.33
10	2.18	3000000	1.42922E+11	1600824.78	400206.20	0.40
11	2.00	3000000	1.20362E+11	1348135.43	337033.86	0.34
12	2.01	3000000	1.21267E+11	1358278.10	339569.53	0.34
13	1.99	3000000	1.19459E+11	1338030.76	334507.69	0.33
14	1.95	3000000	1.14705E+11	1284781.19	321195.30	0.32
15	1.91	3000000	1.0976E+11	1229388.20	307347.05	0.31
16	1.88	3000000	1.06334E+11	1191022.15	297755.54	0.30
17	1.85	3000000	1.02685E+11	1150145.24	287536.31	0.29
18	1.36	3000000	55521403575	621879.52	155469.88	0.16
19	1.83	3000000	1.00471E+11	1125344.99	281336.25	0.28
20	1.80	3000000	97194800644	1088651.44	272162.86	0.27
21	1.78	3000000	95040966094	1064526.95	266131.74	0.27
22	1.75	3000000	92382609375	1034751.45	258687.86	0.26
23	1.74	3000000	90805694794	1017088.88	254272.22	0.25
24	1.74	3000000	91067571211	1020022.08	255005.52	0.26
25	1.87	3000000	1.05863E+11	1185741.63	296435.41	0.30
26	1.77	3000000	94773433598	1061530.39	265382.60	0.27
27	1.78	3000000	95040966094	1064526.95	266131.74	0.27
28	1.78	3000000	95308875661	1067527.73	266881.93	0.27
29	1.77	3000000	94506278175	1058538.06	264634.52	0.26
30	1.75	3000000	92382609375	1034751.45	258687.86	0.26
Average						0.30

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1×10^{10} J)

Khepupara

November

2005

month/year	Dec-05					
Day	Average tidal height (R) m	Basin area(A) m2	Potential energy J	Maximum power generation potential W	Actual power generation potential W	Actual power generation potential MW
1	1.73	3000000	90022327973	1008314.61	252078.65	0.25
2	1.71	3000000	88207669575	987989.13	246997.28	0.25
3	1.21	3000000	44409346800	497416.52	124354.13	0.12
4	1.71	3000000	87949940948	985102.39	246275.60	0.25
5	1.71	3000000	87692589394	982219.86	245554.97	0.25
6	1.70	3000000	87435614911	979341.56	244835.39	0.24
7	1.70	3000000	86922797161	973597.64	243399.41	0.24
8	1.69	3000000	86411487698	967870.61	241967.65	0.24
9	1.90	3000000	1.08898E+11	1219739.67	304934.92	0.30
10	1.68	3000000	85139812800	953626.94	238406.73	0.24
11	1.68	3000000	84886609036	950790.87	237697.72	0.24
12	1.64	3000000	81381348886	911529.45	227882.36	0.23
13	1.62	3000000	78679063294	881261.91	220315.48	0.22
14	1.56	3000000	73646850586	824897.52	206224.38	0.21
15	1.53	3000000	70615004175	790938.67	197734.67	0.20
16	1.51	3000000	68780926575	770395.68	192598.92	0.19
17	1.51	3000000	68326177894	765302.17	191325.54	0.19
18	1.51	3000000	68326177894	765302.17	191325.54	0.19
19	1.50	3000000	67872937500	760225.55	190056.39	0.19
20	1.50	3000000	67421205394	755165.83	188791.46	0.19
21	1.49	3000000	66746435273	747607.92	186901.98	0.19
22	1.49	3000000	67195904948	752642.30	188160.58	0.19
23	1.50	3000000	67872937500	760225.55	190056.39	0.19
24	1.64	3000000	81463948575	912454.62	228113.66	0.23
25	1.53	3000000	70154222344	785777.58	196444.40	0.20
26	1.53	3000000	70154222344	785777.58	196444.40	0.20
27	1.52	3000000	69694948800	780633.39	195158.35	0.20
28	1.51	3000000	68780926575	770395.68	192598.92	0.19
29	1.50	3000000	67872937500	760225.55	190056.39	0.19
30	1.49	3000000	66522266044	745097.07	186274.27	0.19
31	1.47	3000000	64742486794	725162.26	181290.57	0.18
Average						0.21

Khepupara

December

2005

Fig: Day vs. Potential Energy (along x axis 1 sq. unit=1day, along y axis 5 sq. unit=1x10^{10} J)