



বাপা-বেন আয়োজিত

স্থায়িত্বশীল উন্নয়ন লক্ষ্যমাল্লা ও পরিবেশ বিষয়ক বিশেষ সেশনে
পরিবেশিত প্রবন্ধসমূহের সার-সংক্ষেপ

(প্রথম লেখকের পারিবারিক নামের আদ্যক্ষরের ক্রম অনুযায়ী সন্নিবেশিত)

Volume of Abstracts

of the papers presented at the Special Conference on
Sustainable Development Goals & Environment
(arranged in the order of last name of the first author)

সম্পাদক

মোঃ শহীদুল ইসলাম

আস্রায়ক, সেশনের প্রবন্ধ এবং অধিবেশন উপ-কমিটি

১৪-১৫ জানুয়ারি ২০১৭, ঢাকা, বাংলাদেশ

কৃষিবিদ ইনস্টিটিউশন, বাংলাদেশ

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বাপা-বেন আয়োজিত
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পরিবেশিত প্রবন্ধসমূহের সার-সংক্ষেপ
(প্রথম লেখকের পারিবারিক নামের আদ্যক্ষরের ক্রম অনুযায়ী সন্নিবেশিত)

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আয়োজনে
বাংলাদেশ পরিবেশ আন্দোলন (বাপা)
বাংলাদেশ পরিবেশ নেটওয়ার্ক (বেন)

যুগের বৈশিষ্ট্য ও প্রভাব: পরিবেশ ও প্রতিবেশ সুরক্ষায় মেধাবী ও প্রতিভাবানদের গুরুত্ব

তোফায়েল আহম্মেদ

বাংলাদেশ ইতিমধ্যে নিম্ন মধ্য আয়ের দেশে উন্নীত হয়েছে ২০২১ সালের মধ্যে এবং ২০৪১ সালের মধ্যে উন্নত দেশে পাড়ি বা যাত্রা হয়েছে। এর মধ্যে জাতিসংঘ ২০১৫ মিলিনিয়াম ডেভেলপমেন্ট গোল্ড থেকে ২০১৬ ও ২০৩০ সালের মধ্যে উন্নয়নশীল দেশগুলোর জীবনমান উন্নয়নের জন্য টেকসই Sustainable development Goal বাস্তবায়নে ৭টি লক্ষ্য ও ১৬৯ টি কর্মসূচী প্রকাশ করেছে। কিন্তু Sustainable Development Goal অর্জনের অন্যতম লক্ষ্য দারিদ্র বিমোচন, আয়ুস্কাল বৃদ্ধি, জীবনঘাতী রোধ প্রতিরোধ। কিন্তু বাংলাদেশে ৩ কোটি লোক দারিদ্রসীমার মধ্যে রয়েছে। ২০২১ সালের মধ্যে মধ্যম এবং ২০৪১ সালের মধ্যে উন্নত দেশে উন্নীত হতে বিশাল কর্মযজ্ঞের এবং বিনিয়োগের অবকাশ রয়েছে। ১,৪৭,৫৭০ বর্গকিমি বাংলাদেশের মধ্যে ১৬ কোটি মানুষ জনঘন দেশ এর সাথে বর্তমান যে পরিমান শিল্পাঞ্চল নগর ও সভ্যতার বিকাশের মাত্রা দাড়িয়েছে তার সাথে তাল মিলিয়ে দূষন নিয়ন্ত্রন শোধন পরিশোধন করে ভারসাম্য রক্ষা সম্ভব হচ্ছে না। বর্তমানে বাংলাদেশে গ্রাম থেকে শহরে ছোট ছোট শহর থেকে বড় শহর ও রাজধানীতে জড় হচ্ছে। গ্রামে নির্বিচারে কৃষিজমি জলাশয় ভরাট করে ভারসাম্য নষ্ট হচ্ছে। জন্ম হার ১.৪ শতাংশ হলেও নগর অভিভাসন বহুগুন। প্রতি বছর ২০ থেকে ২৫ লক্ষ তরুন শ্রমবাজারে প্রবেশ করছে। বাংলাদেশের বর্তমান এই যুগের বৈশিষ্ট্য সময়ের প্রভাব মোকাবেলায় অভিযোজন ও দূষন হ্রাস Adaptation and Mitigation বড় চ্যালেঞ্জ তবে ভাববার এবং খাটবার লোক যুগে যুগে আসছেন। কিন্তু মেধাবী বা প্রতিভাবানদের সফল প্রয়োগ ব্যতিত সুফল পাওয়া যাবে সম্ভব বলে মনে করা যাচ্ছে না। স্নাতক প্রকৌশলী ও অংক বিশারদদের অংশীদারিত্ব নিশ্চিত করা। তাই টেকসই উন্নয়নের লক্ষ্যমাত্রাগুলো অর্জনে নির্ভরযোগ্য তথ্য ও উপাত্ত সংগ্রহ এর প্রভাবে ক্ষতিগ্রস্ত পরিবেশকে দূষণ নিয়ন্ত্রণ অভিযোজনে ভৌগোলিক বৈশিষ্ট্য ও অবস্থানের সাথে ক্ষাপ খাইয়ে লক্ষ্য নির্ধারণ। নিজস্ব মেধা ও প্রতিভার ভান্ডার গবেষণায়ও ও তথ্য উপাত্ত ভিত্তিক উন্নয়ন ও অভিযোজন। অর্থাৎ প্রয়োজনই আবিষ্কারের সুতিকাগার। বাংলাদেশের মতো ক্ষুদ্র দেশের বিশাল শিল্পায়ন নগরায়ন সভ্যতায় টেকসই উন্নয়ন দারিদ্র্য বিমোচনে কর্ম সৃষ্টি ইত্যাদিতে পানির দেশ সর্বোচ্চ ক্ষতিগ্রস্ত হবে পানি ব্যবস্থাপনা। গনপ্রজাতন্ত্রি বাংলাদেশ সরকার পানি ব্যবস্থাপনায় মনোযোগ দিলেও প্রকৃত হাইড্রোলজিষ্ট এবং হাইড্রোলিক ইঞ্জিনিয়ার দ্বারা পানি ব্যবস্থাপনা ও উন্নয়ন তদারক পরিকল্পনা প্রণয়ন ও বাস্তবায়ন না করায় এক্ষেত্রে ফলপ্রসু হওয়ার সম্ভাবনা সন্দেহ থেকে যাচ্ছে। বর্তমানে বাংলাদেশের ৪০% তরুন

নিষ্ক্রিয়। এদের কর্মসংস্থান শিক্ষা, দক্ষতা, সামাজিক নিরাপত্তা বিধান ও স্বাস্থ্য রক্ষা করা প্রয়োজন। বাংলাদেশ মধ্যম আয়ের দেশ উন্নত দেশ এর সাথে টেকসই উন্নয়নের লক্ষ্যমাত্রা অর্জন এবং জলবায়ু পরিবর্তনের অভিঘাত মোকাবেলায় মেধা ও প্রতিভা সুসম সুষ্ঠু প্রয়োগ ব্যতীত কল্পনা করা যায় না। মেধা ও উদ্ভাবনীর ক্ষেত্রে বিনিয়োগ করতে হবে। বাংলাদেশে মেধাবী যথাযথ নিয়োগ এবং বিদেশে চলে যাওয়ার শিক্ষা ও জ্ঞান নির্ভর কর্মকাণ্ডের ঘাটতি। এর জন্য উদ্ভাবনশীলতার জন্য বিনিয়োগ বিবেচনায় নেয়া। তবে আশার কথা বিনিয়োগ থেকেও আমাদের অর্জন বেশি।

Need Combined Committed Effort and Special Attention on Other Sustainable Goals under 6 by Relevant Organizations to Achieve the Sustainable Development Goal 6.6 (Water Related Ecosystems) in Bangladesh

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Bangladesh has a good reputation on the Millennium Development Goals (MDGs). Government of Bangladesh is trying to do better on the Sustainable Development Goals (SDGs). Among the developing countries, the growth rate and relevant indicators are much more growing position than other competitors. So, government intention is very practical and timely. Honorable Prime Minister of Bangladesh selected as a one of the core member of High Level Panel on Water(HLPW). The HLPW made with 11 heads of state/government and 1 special advisor. It co-chaired by the honorable president of Mauritius and Mexico, co-convened by the UN SG and the president of the World Bank. So, we need to put more attention on the SDG 6.

The main target of SDG 6.6: water related ecosystems: by 2020, protect and restore water related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes. UN water declared " Change in the extent of water-related ecosystems over

time" as indicator and " spatial extent, quantity of water contained within these ecosystem and health or state of these ecosystems" as sub-indicators. We have near about 30 government organizations working on this field. Besides the several non-government organizations, environmental club/societies, international organizations are also working. This search tried to find out the current status, sub-target, plan and activity they could take to protect and restore the ecosystem in different ways. To archive SDG 6.6 need to combined effort on all of the other SDGs under6; means 6.1,6.2, 6.3,6.4,6.5. The suggestion came from the findings could take place to the organizations to set their activity by 2020.

Impact of Climate Change and Rapid Urban Development of Chittagong City on Halda River

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Chittagong, situated in the southeastern coast of Bangladesh, is one of the fastest growing urban areas in Bangladesh, both in the perspective of industrial growth and population growth. Unplanned urbanization has put extreme stress on water supply, habitat, transport, drainage and many other urban facilities. As of year 2015, there was a huge imbalance in demand and supply of water in the city. The city's water supply is dependent on Halda river and ground water sources. With increased demand of water supply, the extraction of water from Halda has increased too. But the exclusivity of Halda river is that Halda is the only river in Bangladesh where major Indian carps spawn naturally which makes this river a unique heritage of this country. This stress of increased demand of water has resulted in increased water withdrawal which eventually causes siltation in the river that hinders the natural flow of Halda. It is also observed that in the process of urbanization, the physical characteristics of Chittagong

is gradually changing as open space have been transformed into building areas, low land and water bodies have been transformed into build up lands etc and vegetation has decreased and all these are hindering the ground water recharge process. With declination in ground water table, stress on Halda for water supply would increase even more which shall cause more deterioration of Halda. Moreover, the coastal region of Bangladesh is highly vulnerable to climate change due to saline water intrusion, erratic rainfall, sea level rise and many other climatic events. Hence, in addition to the threats imposed by rapid unplanned urban growth of Chittagong, Halda, as a coastal river, is vulnerable to climate change. This paper is an overview of urban growth-water supply-climate change nexus for Chittagong city and Halda and it also identifies the multifaceted vulnerability of river Halda linked with urban growth of Chittagong city.

Analysis of Female's Perception on Earthquake Risk in Dhaka City

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Bangladesh is possibly one of the most vulnerable countries to potential earthquake threat and damage. An earthquake of even medium magnitude on Richter scale can produce a mass graveyard in major cities of the country, particularly Dhaka and Chittagong without any notice. This frightening issue has created agitations among our experts, geologists, environmental scientists and meteorologists and made them thinking over the safety of these city dwellers. They have also urged the

government to take effective measures of preparedness and to create public awareness about this destructive, fatal natural disaster. The objective of the study is to bring forward the real picture of the females' (who comparatively stay longer time in houses) attitudes, knowledge and beliefs in the context of earthquake vulnerability in Bangladesh. A questionnaire survey method was adopted for this cross sectional study. One hundred and fifty females of various social position including professionals, students and housewives responded to the questionnaire containing 33 questions. In this research random samples were taken.

While respondents displayed a reasonable degree of awareness about the possible degree of destructibility that an earthquake may cause, a very few of them possess knowledge about Richter scale. The survey also demonstrates that the majority of the respondents neither have ever practiced any escape route nor participated in escape drill. They even do not have any idea about the urban emergency shelters. The absence of knowledge regarding rescue make them conduct similar reacting behavior e.g. start running at the time of earthquake. But as a whole, findings indicate that public awareness about earthquakes needs to be made through programs initiated by teachers in schools and experts of related government's departments.

However, during the last eight years, the frequency of earthquake occurrences and damages caused by some of them (magnitude between 4 and 6) inside the country or near the country's border, has raised the awareness among the general people and the government. But still study on earthquakes in South Asian region to assess the vulnerability both from the structural and social point of view is very limited. This study will open a new avenue for further research on the phenomena of city dwellers. It will also enrich literature review for future researches of such kind and help to find out guidelines about the probable solutions for the multidimensional environment related problems caused by earthquakes.

Urban Materialism and Environment

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The paper mainly focuses urban material culture and its adverse impact on urban management, waste disposal activities and finally the environmental services. After World War II global trade and economy grow geometrically and material culture originates as its by-product and continues to date from younger people to elderly one globally. First it seems to be merely a triggering source of trade growth; but over the times, it starts to be an awesome phenomena to the regards of waste management and environmental conservation. The study finds some significant results that increase of personal purchasing capacity, pleasure in aesthetes, upholding the social esteem push people the urban materialistic culture into a hyper level. It causes a serious risk of waste management and ecological aspects. Urban governance across the world has to cost a lion portion its annual budget for waste management and environmental preservation. However, the more wastes (liquid and solid) generates everyday that cannot be managed more than seventy or eighty percent resulting in a severe environmental costs. The paper mainly aims to find out the socio-psychological causes of increasing materialism and its effects on urban governance, waste management and city environments. The study would be conducted in qualitative approach and secondary sources will be used for data collection. Books, journal articles, media reports can be applied as data source. Immaterialism may be a good source of pleasure, happiness and social status that have to take as a social movement to minimizing the materialism and moreover, socio-politically we have to follow the ideology recycle, reuse and reduce.

Policy Coherence for Implementing the Sustainable Development Goals: Learning the Right Lessons

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The 2030 Agenda for Sustainable Development adopted sustainable development goals (SDGs) in September 2015 intended to end poverty and achieve people's well-being and environmental sustainability by 2030. On the other hand, the Millennium Development Goals (MDGs) were primarily aimed at ending extreme poverty in all its forms in developing countries. The most important departure from this is that the SDGs explicitly broaden the focus to all countries – including the developed countries as sustainability cannot be achieved in isolation. The SDGs provide a unique opportunity for shaping law, policy and institutions across the globe for the implementation of effective and ambitious plan of action to deliver sustainability for all. However, as some of the developing countries and least developed countries (LDCs) in Asia considered SDGs as an extension of MDGs, MDG-2 or MDGs plus therefore might be tempted to adopt the MDGs approach while implementing the SDGs. Again, in the developed world, certain goals will matter much more, and efforts can be tailored to reflect this in their SDG implementation strategy. That is why, it is vital to understand and learn from each other while implementing the SDGs. For example, countries like Bangladesh worked substantially on the MDGs and has actively participated in the SDGs negotiation therefore their experiences are vital to understand challenges for implementing SDGs in Asia. On the other hand, in terms of environmental sustainability, most of the developing countries and even developed countries are still lagging behind most of the Nordic countries. Therefore, the experiences of Nordic countries such as Sweden could have important lessons for Asian countries including developed, developing and least developed countries for attaining environmental sustainability.

The experiences of Nordic countries particularly in the area of climate change (SDG 13), green energy (SDG 7), innovation (SDG 9) and governance (SDG 16 and 17) approaches integrating institutional and sectoral issues for attaining environmental sustainability could be useful for the LDCs like Bangladesh. In the context of LDCs like Bangladesh having critical climate vulnerability, energy shortage, reliance on development aid and foreign financial and technical assistance for major developmental works and fragmented approach of development, it is crucial to understand, how to use specific goals strategically in order to press for change and how to link several goals to generate co-benefits and complementary effects in an effort to create coherence between international norms to domestic policies. It is important to have a supportive and robust legal framework and institutions to build partnerships among global and governmental institutions and private entities to strengthen the three inter-linked pillars of sustainability (social, economic and environmental). This study will be based on partially ongoing research of this researcher and will adopt doctrinal, comparative and case study approach with special focus on Bangladesh and Sweden. It will particularly address challenges for implementing SDGs, in general and particularly to address specific SDG issues in the field of SDG 13 on Climate Change, SDG 7 and 9 with special focus on promoting innovation, development and transfer of low carbon technologies and issues of justice, partnership and coherence under the SDG 16 and 17 and thereby suggest a coherent, transformative and integrated approach for the achievement of SDGs at the global, regional and national levels.

World's Energy-Climate Conundrum: SDG 7 vs. INDC's- Myths and Realities

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Humanity faces a formidable conundrum from its two ambitious, but often conflicting goals: sustainable development and

prevention of pollution and irreversible climate change blamed on unmitigated development activities. Seventeen specific sustainable development goals (SDG's) were identified by the UN to lift millions out of poverty, establish gender equity, promote peace and prosperity, etc. One of these goals, SDG 7, seeks to 'ensure access to affordable, reliable, sustainable and modern energy for all.' Availability of affordable coal had made the industrial revolution of the 18th and 19th centuries possible and access to cheap oil and gas led to the phenomenal economic and technological progress of the 20th century. Both benefited mainly the developed world.

Use of these cheap, affordable modern fossil fuel sources without attention to their downsides is blamed for pollution and release of greenhouse gases (GHG's) resulting in global temperature rise and potentially the onset of climate change. Increasing reliance on these fuel sources now by the developing world, nearly 40% of world's population, has compounded this challenge. Unmitigated use of fossil fuels may ultimately make the planet uninhabitable. Developed and developing countries generally agree on the premise of climate change but differ in their approaches for addressing the challenge, exacerbating the energy/climate conundrum. Developing countries, often suffering more from the impact of climate change, blame developed countries for its early onset, seek assistance to adapt and mitigate, and demand their own 'carbon space' to continue use of fossil fuels for economic growth. The developed world often appears reluctant to accept these terms. However, despite these differences, 195 countries signed the 2015 Paris climate treaty that envisions holding the global temperature rise below 2 deg. C above that of the industrial age in order to prevent irreversible climate change. Nations gave voluntary undertakings, through their Intended Nationally Determined Contributions (INDC's), to reduce their country's GHG emission to achieve this goal.

In this paper, we briefly review the current trajectory of the world's energy/climate conundrum and then examine the INDC's of select countries in three categories – developed, rapidly growing, and developing. We assess the reality of the steps INDC's

propose to alter this trajectory and reduce GHG emission while meeting the growing energy demand ala SDG 7. The reality of INDC's varies widely: some are comprehensive but somewhat unrealistic, some lack hard choices relying primarily on the proverbial low hanging fruits to show progress, others appear counter to the actions underway on the ground, and some may even lead to collateral environmental damage, such as the destruction of rainforests and transfer of GHG footprints to weaker neighbors. None account for the transfer of GHG emissions underway to the developing world from outsourcing of manufacturing by the developed world; such accounting is desired for a fair allocation of GHG footprint. None of the INDC's accounts for the evolving knowledge of downsides of the GHG-free so-called "clean" energy sources. Thus, to realistically address the energy/climate conundrum, a paradigm shift is likely required in meeting the world's energy needs and in gauging sustainable development. Finally, the paper poses two questions: 1) What would such a shift entail and 2) can developing countries leap frog in their clean energy quest by taking advantage of the shift?

Bangladesh Energy Trajectory- Rampal to Rooppur to Madhyaneela: Questions that Must be Asked

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Bangladesh is a rapidly developing country with a growing energy demand but a limited access to modern primary energy resources. It faces major challenges from climate change. The country has two broadly distinct sectors with an evolving mix: the urban/ industrial/ commercial sector and the rural/domestic sector.

Urban/Industrial/commercial sector: This sector is mainly reliant on electrical power. Absence of reliable power in this sector had

adversely impacted economic growth and led to frequent load-shedding. Thus, the government undertook an ambitious plan to increase electricity production. Their power sector master plan envisions an evolution of installed capacity from 7300 MW in 2010 (9% oil, 5% coal, 82% natural gas) to 37,750 in 2030 (10% oil, 50% coal, 25% natural gas, 15% “other” including renewable and nuclear). As of December 1, 2016, the installed generating capacity was 13,095 MW. A large number of complex decisions were needed to develop and implement this plan and it is not without its critics. For example, the 1320 Mwe Rampal coal plant near the Sundarbans, a UNESCO World Heritage site and the 2400 Mwe two-reactor nuclear plant at Rooppur in Pabna in close proximity to a densely populated region, have been very controversial. The government has approved installation of a 200 Mwe, 1000 acre solar farm at Madhyaneela in Teknaf district. Large-scale implementation of grid-based solar would be challenging. Recently, Chevron, the country’s major natural gas producer, has announced plans to sell its assets in Bangladesh.

Rural/domestic sector still encompasses the majority of the people and is reliant on disease-causing biomass stoves for cooking and heating, and risky kerosene lamps for lighting. Over 4 million roof-top-solar home systems in rural areas have begun to alleviate the lighting/cooling needs and positively impact people’s lives. Biogas plants have been implemented in some areas for cooking. The UN Foundation has initiated an advanced cookstove program for developing countries including Bangladesh. Advanced cook stoves designed by the BSCSIR were first distributed in Bangladesh in the 1980’s 30 years back but did not have a significant impact. In recent years, NGO re-initiated such programs and the government envisions an increased distribution of advanced cook stoves to significantly reduce biomass fuel consumption and the associated deforestation and pollution.

In order to facilitate the discussion, the moderator will pose a number of questions on both sectors, directed to the panelists. These would encompass primary energy source choices made in the master power plan, and internal technical/ management capacity enhancement, stake-holder engagement, policy

decisions-short and long term, and potential partnerships, in order to address the country's energy/climate challenges.

The Case for Small Modular Reactors in Lieu of Large Nuclear Power Plants

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Nuclear energy can be considered a viable source of power, especially with respect to mitigating climate change. However, without carrying out extensive consultation with experts and the public, the building of a 2 Gigawatt nuclear power plant in Bangladesh is likely to be considered a risky step given the delicate ecology and dense population of the country. Concerns about the financing and cost estimates, operating technical expertise, supply of cooling water, removal of radioactive waste, and numerous other safety features have already been expressed in the public domain. The large plants carry a big ecological footprint. Now is the time to initiate a discussion on considering small modular reactors (SMRs) with output of less than 300 Megawatts in lieu of large-scale nuclear power plants. Even though the commercialization of SMRs are still in the developmental stage (with a handful operational in the world), their compact architecture with smaller land requirements and less radioactive inventory are potentially optimal for ecologically fragile countries like Bangladesh. SMRs rely less on active safety systems and are easily decommissioned at the end of their lifetime. In countries where electrical grid capacity is limited, SMRs are also good for location-distributed power generation. By building a small scale 100-300 megawatt SMR, the government has the opportunity to develop scientists, engineers and skilled workers who could make an expert team capable of deciding the fate of large-scale nuclear power generation in the future.

রায়ানু দুর্যোগ : প্রাণী ও মানুষের উপর তার প্রভাব

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১৯১৪ সালে প্রকাশিত ২৪ পরগনার বেঙ্গল ডিস্ট্রিক্ট গেজেটিয়ার থেকে জানা যায় ১৫৮২ সালে একটি মারাত্মক ঘূর্ণিঝড় বাকেরগঞ্জ জেলার উপকূল অতিক্রম করে এবং দুই লক্ষ (২০০,০০০) লোক মারা যায়। ঝড়টি জলোচ্ছ্বাস সহ আক্রমণ করে এবং ৫ ঘন্টা স্থায়ী হয়। শুধুমাত্র শক্তভিতের উপর স্থাপিত মন্দির ছাড়া বাকি ঘরবাড়ি ও নৌকা-জলযান সব ভাসিয়ে নিয়ে যায়। প্রাণির কথা উল্লেখ না থাকলেও বলা যায় তারাও রক্ষা পায়নি এবং উদ্ভিদকূলেরও ব্যাপক ক্ষতি হয়েছিল। সুতরাং বলতে পারি ঝড়-ঝঞ্ঝা-জলোচ্ছ্বাস উপকূল অঞ্চলের জন্য নতুন নয়। অনেক জান-মাল বিসর্জন দিয়ে জনগণ এই দুর্যোগের মোকাবেলা করে আসছে। গত ২১ মে, ২০১৬ বাংলাদেশের উপকূল অঞ্চল দিয়ে অতিক্রম করে দানবীয় ঘূর্ণিঝড় রোয়ানু। বিভিন্ন স্থানে বাতাসের বেগ ছিল ঘন্টায় ৬০ থেকে ১২৮ কিলোমিটার। পাঁচ ঘন্টা স্থায়ী ঘূর্ণিঝড়টি মূল নিম্নচাপে পরিণত হয়ে ২১ মে, শনিবার (২০১৬) রাত ৮:০০ টা নাগাদ খাগড়াছড়ি দিয়ে ভারতের ত্রিপুরা ও মিজোরামের দিকে চলে যায়। এই প্রবন্ধে রোয়ানুর মূল বৈশিষ্ট্য ও প্রভাব নিয়ে আলোচনা করা হয়। রোয়ানুর মূল বৈশিষ্ট্য এবং প্রভাবঃ মৃত্যু: ২৩ জন, পতিবেগ: সময় ও অঞ্চলভেদে ৬০-১২৮ কিলোমিটার/ঘন্টা, বাতাস : ঝোড়ো, বৃষ্টি : প্রবল, বেড়িবাঁধ : ভেসে নিম্নাঞ্চল প্লাবিত (১৫০ কি.মি. সম্পূর্ণ বিলীন হয়েছে), ঘরবাড়ি : ব্যাপক ধ্বংসপ্রাপ্ত যাকে বলে লন্ডভন্ড, সময়কাল : ২১/০৫/২০১৬ দুপুর ১২ টায় চট্টগ্রাম ও বরিশাল উপকূলে আঘাত হানে এবং বিকাল ৫টা নাগাদ মূল নিম্ন চাপে পরিণত হয়, উদ্ভিদ : গাছপালা-গুলা উপড়ে পড়ে, প্রাণি : অধিকাংশ প্রাণি মারা যায় এবং হাঁস-মুরগি-পোল্ট্রিসহ গৃহস্থালী প্রাণিরা মারা যায়, আকার : ঘূর্ণিঝড়টির ব্যাস ২০০ কি.মি. ও প্রান্তসীমা ৭০০ কি.মি. পর্যন্ত বিস্তৃত ছিল, জলোচ্ছ্বাস উচ্চতা : স্বাভাবিকের চেয়ে ৩-৬ ফিট উঁচ, বিদ্যুৎ খুঁটি : বিদ্যুতের খুঁটি উপড়ে পড়ে এবং প্রবাহ বন্ধ হয়ে যায়। শুধুমাত্র চ.বি.তে উপড়ে পড়ে ১৫-২০টি খুঁটি, জলাবদ্ধতা : চট্টগ্রাম নগরের খাতুনগঞ্জ, ডিসি রোড, চাঁদগাওসহ দেশের অন্যান্য স্থান, রাস্তাঘাট : গাছ পড়ে থাকে। চট্টগ্রাম বিমান বন্দর সড়কের রাস্তা দেবে যায়, ফসলের জমি : পানিতে তলিয়ে যায়, জীববৈচিত্র্য : ব্যাপক ক্ষতি হয় এবং কিছু প্রজাতি হারিয়ে যাওয়ার আশংকা দেখা দেয়।

আবহাওয়া অধিদপ্তর জানায় প্রবল বৃষ্টি হওয়ায় ঘূর্ণিঝড়টি দুর্বল হয়ে পড়ে এবং এর

কারণে যতটা ক্ষতি হতে পারত, ততটা হয়নি। আমার প্রশ্ন ঘূর্ণিঝড় এমনই: জোয়ার ছিল না এবং দিনের বেলায় হওয়াতেও ক্ষয়ক্ষতি কম হয়েছে। যা হয়েছে কম কী? এক কুতুবদিয়ায় ক্ষতি হয়েছে ৫০০ কোটি টাকা। ছোট নৌযান গুলোর কথা বাদ দিলাম। বাংলাদেশ শিপিং কর্পোরেশনের এমভি বাংলার শিখা ও বিদেশী জাহাজ এমটি গাগাসন জহরের মধ্যে ধাক্কা লেগে তীরের অদূরে আটকা পড়ে। জাহাজ জট বেড়ে যায়। টাগবোটসহ অনেক নৌযান সৈকতে উঠে যায়। বন্দরের ১৯৯৮ সালের সমীক্ষার সূত্র ধরে প্রথম আলোর প্রকাশিত তথ্য অনুযায়ী ১৯৯১ সালের ঘূর্ণিঝড় পরবর্তী বন্দরের পুনর্বাসনের ব্যয় দরা হয় ১৬০ কোটি এবং সর্বশেষ ঘূর্ণিঝড় কোকেনের ক্ষয়ক্ষতি ধরা হয় ১ কোটি ৬১ লাখ টাকা। এবারের ব্যয় পরে জানা যাবে। ভোলার তজুমুদ্দিনে একটি মার্কেট সম্পূর্ণ উড়ে যায় এবং সেখানে এখন পর্যন্ত বাণিজ্যিক কার্যক্রম বন্ধ রয়েছে। পানি ঢুকে চট্টগ্রামের পাইকারি বাজার খাতুনগঞ্জ ও চাক্কাইয়ে রাখিমাল- চাল, ডাল, পিয়াজ, চিনিসহ ভোগ্যপণ্যের ব্যাপক ক্ষতি হয়েছে।

রোয়ানুতে উপকূলবাসী কয়েক হাজার কোটি টাকা হারালেও বাজেটে এর উল্লেখ নেই কীভাবে এদেরকে পুনর্বাসিত করা যায়। ২০১৬-১৭ অর্থবছরের বাজেটে পানি সম্পদ মন্ত্রণালয়ের মোট উন্নয়ন বাজেট বরাদ্দ রাখা হয়েছে ৩৭৫০ কোটি টাকা যা গতবারের তুলনায় ১০০০ কোটি টাকা কম। দুর্যোগ ও ত্রাণ মন্ত্রণালয়ের জন্য বাজেট বরাদ্দ রাখা হয়েছে ৯২২ কোটি টাকা যা গতবারের তুলনায় ১০০ কোটি টাকা কম।

১৯৯১ সালের ২৯ এপ্রিল প্রলঙ্করী ঘূর্ণিঝড়ে ১,৩৮,০০০ মানুষ মারা গেল। ফসল, গাছপালা, প্রাণি, হাঁস-মুরগী, পাখি মারা গেল। দেশ-বিদেশে হায় হায় রব উঠল। ২০০৭ সালের পর থেকে ধারাবাহিকভাবে আইলা, সিডর, কোমেন, বন্যা ও সর্বশেষ রোয়ানুতে জীববৈচিত্র্য, বন, বন্য প্রাণি, মানুষ ও জনপদের ব্যাপক ধ্বংসযজ্ঞ হয়ার পরেও আমাদের টনক নড়ছে না। উপকূলীয় বন্যা ও রোয়ানুর আঘাতে ৪ কোটি উপকূলবাসী জীবন, সম্পদ ও ঐতিহ্য হারানোর ঝুঁকিতে রয়েছে। এখনও কয়েক লক্ষ লোক খোলা আকাশের নীচে অবস্থান করছে। মিঠা পানির অভাব অথচ লবণ পানির প্রকোপ। স্কুলগামী শিশুরা শিক্ষা উপকরণ হারিয়েছে।

এবারের বিশ্ব পরিবেশ দিবসের প্রতিপাদ্য হচ্ছে বি ওয়াইল্ড ফর লাইফ-জীবনের জন্য ক্ষিপ্র হও। আসুন আমরা জীবনের জন্য উদ্ভিদ ও পানি রক্ষা করি। পরিবেশ রক্ষা করি। বাংলাদেশের মতো নদিমাতৃক দেশের উন্নয়নের প্রবেশদ্বার হচ্ছে উপকূল। প্রবেশদ্বার বন্ধ করলে কোন উন্নতি হবে না। সে রকম চেষ্টা হবে আত্মঘাতি। অপার সম্ভাবনার পানি সম্পদ ও প্রাণ প্রবাহ সাবলীল ও অব্যাহত রাখি।

Jumping Spiders: A Potential Predators of Garden and Field-Crops of Bangladesh (Araneae: Arachnida)

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Jumping spiders (Family Salticidae) are one of the important group of predaceous arthropods distributed throughout the world. These spiders are unique, fascinating and attractive in their colour, ornamented body decoration and appearance. In Bangladesh, these spiders play a potential role in controlling of insect pests both in the garden and field-crops. But study on this group of spiders in our country is scarce except the contributions of Chowdhury and Nagari (1981), Chowdhury and Pal (1984)), Kamal, et al. (1992), Biswas (1995, 2016a,b), Begum and Biswas (1997), Biswas and Begum (1999), Biswas and Raychaudhuri (1997, 2012 ; 2014), Biswas, et al., (1993) and Okuma, et al., (1993). But in the world fauna, the contributions are numerous including our neighbouring South-Asian countries like – India (Tikader, 1967, '73, '74, '75, '77a,b ; Tikader and Biswas, 1981; Keswani et al., 2012 ; Sen, et al. 2015 ; Dhali, et al., 2016), China (Chen & Zhang, 1991 ; Zhao, 1993 ; Peng, et al., 1993 ; Song, et al., 1999), The Philippines (Barrion & Litsinger, 1995), Singapore (Koh, 1989), Japan (Yaginuma, 1986 ; Ikeda, 1993, '96, 97 ; Tanikawa, 1993) etc. The present paper contains taxonomic description and ecological role of some jumping spiders of Khulna region with their distribution to the world fauna. Necessary drawings and photographs are also made including key to the species.

Feasibility of Solar-biomass Hybrid Cold Storage For Un-electrified Rural Areas of Bangladesh

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The aim of this research was to investigate the economic and technical feasibility of a solar-biomass hybrid cold storage to prevent the loss of potatoes at the farmer level. This study mainly focused on a 20 MT cold storage facility. A similar model based on a hybrid between solar and biomass energy has already been tested successfully in India. This model will be used as an example with possible adjustments made to fit it in the context of Bangladesh. This study has two main objectives: to determine whether the hybrid-cooling model is technically and economically feasible and to address the potential scope for its implementation in rural off-grid areas where no grid connection is expected within the next 15 years.

In order to fulfil the objectives of the feasibility study, field and company visits were undertaken in Bangladesh, India and the Netherlands. The study was mostly qualitative in nature and utilised standard data collection techniques: In-Depth Interviews (IDIs), Key Informant Interviews (KIIs), Focus Group Discussions (FGDs) and direct observations, with some quantitative calculations.

The report starts with a review of relevant literature on the importance of potato storage, cold storage techniques and the various renewable energy based cooling technologies. Three renewable energy models are discussed in the paper, i) solar based model, ii) biomass based model iii) solar-biomass hybrid model. The economic and technical feasibility of solar cooling, biomass-based cooling and solar-biomass hybrid cold storage is discussed to get a broader sense of the feasibility parameters.

All three models are expected to have a significantly negative

NPV, mainly due to the large investment costs. This implies that the economic feasibility will strongly rely on subsidies from governments or other organisations. Given the fact that India is already operating cold storage facilities that are run by solar and biomass energy with the support of their government, it is assumed that this may be possible for the case of Bangladesh. The hybrid model will require a larger investment outlay due to the additional components, but there are significant cost reduction opportunities once the model is standardized and commercialised.

Furthermore, the findings suggest that implementation of all three of the evaluated renewable energy based cold storage models is feasible in Bangladesh when appropriate use is made of potential revenue streams from by-products such as silica, from ash and from excess electricity for village electrification. However, a number of issues need consideration beforehand such as the appropriate location and technology need to be chosen and expert opinion is needed during the design and implementation phase.

Some Environmental Policies for Adapting Climate Change in Bangladesh

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The objective of the policy brief is to provide policy makers with contextual information as input in decision making in the context of changing climate, environment and natural hazards for enhanced human welfare. Contextual information is scanty in the Asian LDCs and SIDS. Analyzing historical data, scientific findings, grey literature and local experiences, the synthesis addressed priority issues like climate change, droughts, floods, marine ecosystem and coastal zone management in the Asian LDCs but Bangladesh in particular. As to policy relevant findings mention may be made of deep water reservoir, crop

diversification, drought resistant crops, early warning and bio-fortification of cereals for managing draught. Coping with climate extreme may be facilitated through vulnerability categorization for priority, salt tolerant crop variety, modeling and capacity building policy measures. Marine environment focused hilsha fish production and coastal zone management issues. Livelihood of fishermen can be promoted through protection of spawners, nursery ground, control of mesh size of catch, limiting marine pollution, and establishing laboratory and hatchery for artificial breeding at the Bay. Coastal zone can be protected through establishment of integrated coastal zone management policy, triple-tier tree defence mechanism and involvement of stakeholders in development of smart coastal cities. Flood risk can be further reduced through integration of traditional wisdom and community involvement, flood shelters, flood resilient housing, environment impact assessment of embankments, appropriate choice of plants and flood resistant tree crops. These and related other relevant issues have been elaborated in different sections of the policy brief.

Microbial Contamination of Drinking Water from Risky Tubewells in Rural Bangladesh: A Challenge to SDGs

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Improving water quality by reducing pollution has been identified as an important target of Sustainable Development Goals (SDGs).

Bangladesh has made a significantly improvement in this sector over the last decades, but some areas have received little attention due to geophysical, hydrological and economic aspects. This study, conducted in 40 selected upazilas covering four hydrological regions of Bangladesh, aimed at determining the risk of selected shallow tubewells (STW; depth <30m) used for drinking purpose (n=26,229). We used WHO's sanitary inspection guidelines for determining "severity of risk" related to MC of STWs. About 62% of sampled tubewells were at medium to high risk according to WHO's sanitary inspection guidelines, while the situation was worst in south-west region. Microbiological contamination was significantly higher in sampled category-1 STWs (within 10m of latrine) compared to category-2 tubewells (>10m from latrine), while the number of contaminated tubewells and level of contamination was higher during wet season. About 21%, 54%, and 58% of water samples collected from category-1 tubewells were contaminated by E. coli, FC, and TC respectively during the wet season. The number of category-1 tubewells having E.coli was highest in the north-west (n=8) and north-central (n=4) region during wet season and dry season respectively, while the level of E.coli contamination in tubewell water (number of CFU/100 ml of sample) was significantly higher in north-central region. However, the south-west region had the highest number of FC contaminated category-1 tubewells (n=16 & n=17; respectively during wet and dry season) and significantly a higher level of TC and FC in sampled Category-1 tubewells than north-west, north-central and south-east region, mainly during wet season. Multivariate regression analysis could identified some sanitary inspection indicators, such as tubewell within <10m of latrine, platform absent/broken, pollution source (i.e. household waste dumping point/poultry/dairy farm) within 10m of tubewell and unimproved sanitation facility which were significantly associated with presence of microbial contaminants in STW water (p<0.01). Construction of pit latrine in areas with high water table should be highly discouraged. Raised and sealed pits or flush/pour flash to septic tank could be installed in low lying areas considering suitability of soil condition. Installation of TWs having shallow depth should be considered sanitary inspection

criteria including distance over 10m from the pollution sources. Water should be treated before drinking.

Sustainable Use of Groundwater for Ensuring Food Security in the Northwest Region of Bangladesh

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Groundwater is the main source of irrigation for modern rice varieties for ensuring food security in many countries including Bangladesh. However, this important resource is being over-exploited and depleted beyond natural replenishment of aquifers from rainfall and river flow. This study covered five districts in northwest Bangladesh aimed at exploring issues related to groundwater sustainability for irrigation in the context of maintaining and sustaining food security in Bangladesh. Both primary and secondary data were utilized considering environmental, social and economic aspects for assessing sustainability of groundwater use for irrigation purposes. Results revealed a declining trend of groundwater table in the northwest region of Bangladesh during 1981-2014, where the most depleted groundwater table was found in Rajshahi followed by Pabna, Bogra, Dinajpur, and Rangpur districts. The magnitude of depletion of groundwater table in Rajshahi district ranged from 4m-12m during 1981- 2014. The major influencing factors for natural replenishment of aquifers included a significant reduction of total annual rainfall by about 25.6% during 1981-2014; minimal decline of average annual river water levels; significant

reduction of wetland areas by about one-third. Other than the above mentioned factors, the onset of increasing irrigated area for dry season rice (boro) is considered to be a main driver of groundwater depletion which has increased by about three folds during 1981-2014. Efficient irrigation management practices, such as low water demanding high value crops, volumetric water charging system, wet and dry irrigation system, etc. could be introduced widely to reduce excessive withdrawal of groundwater use. Efficiency of existing water lifting devices including STW and DTW could be enhanced for increasing command area and discouraging new installation of tubewells. Bangladesh has recently experienced moderate rainfall during September-October months. In most cases, farmers wait for rainfall and delay in transplanting boro rice till December-January when soil moisture became less and groundwater table depleted quite a far away from the ground surface. If bororice transplantation is completed by November thus boro cultivation may benefit from late-monsoon rains and place less pressure on groundwater resources, which may enhance sustainability of this resource for ensuring food security.

Improved Water Source and Sanitation Facility Accelerate Economic Growth in South Asia

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This paper attempt to examine improved water and sanitation facility accelerate economic growth in South Asia through co-integration and vector error correction model (VECM) over the period 1991 to 2015. Cointegration analysis indicates a long-run relationship between the two variables. A unidirectional causality from improved water and sanitation to growth is found on the basis of Error Correction Model (ECM). The main result of

the study is that improved water and sanitation invariably leads to economic growth. As a policy suggestion, efficient management of improved water and sanitation should be conducive to higher productive capacity which will lead to higher growth in South Asia.

Movement Against ‘Development’ and Big Dams

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India’s Northeast region, particularly the state of Manipur, has witnessed a paradigm shift in the approach of development in the last six decades – from an inaccessible region to the land of opportunities. Fervent efforts are being made at the moment not only to sell the region’s virgin natural resources but also exploit its hydro potential. The opening up of the region has attracted prospective investors as well as traders. However, such initiatives heralded in the name of development have been met with resistance by the indigenous people and over a period of time has become a movement in its own right. The situation, on one hand, the readiness to bring about development, and on the other hand, resistance against such moves demands a deeper understanding of the paradoxical contradictions. One aspect, perhaps, is the notion of absence of human centric development, where the investors and traders are only interested in profit. In addition, it can also be a situation of loss in terms of environmental degradation or displacement. In the above light, the paper seeks to assess

movement against construction of mega dams in the state of Manipur and questions if the indigenous peoples are anti-development.

Affordable & Sustainable Urban Housing Prospect

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Bangladesh is a developing country with an approximate urban population of 35 million people, of which over 25 million resides in Dhaka alone. Studies show out of total housing delivery system in Dhaka, formal legal settlements comprise only 40%. More than 5 million are living in slums and squatters for non-inclusive policy. Slums are defined as settlements with a minimum of 10 households or a mess unit with a minimum of 25 members having; predominantly feeble housing, excessive population density, crowded rooms, inadequate environmental services, especially water and sanitation, meagre socio-economic status and lack of security of tenure. The non-inclusive policy for housing initiatives in Dhaka drive this large number of people into vulnerable state and force them to live substandard life only intensifying social class distribution in this city.

The socioeconomic status of the community is defined by low income. People living in these settlements are faced with inadequate supply of urban facilities such as water, electricity, garbage disposal, sanitation, sewerage, and fuel for cooking as well as degradation of social and physical environment. Also security of tenure is captured by vulnerability to eviction. The quality of housing is one of the most basic indicators characterizing slum settlements.

Prejudiced by their social and financial vulnerability, investors are rarely interested to invest in housing for this social class, projecting loss in return of investment. Therefore with no prospect of investors,

no capital and no proper policy for this social class, they are trapped within this cycle of poverty. Whereas, the fact is, studies indicate people living in slums and squatters pay almost twice the amount of rent per square feet than people living in apartment buildings.

In order to achieve comprehensive advancement and sustainable development of this country, ensuring basic rights to optimum and affordable living standard for this major vulnerable urban population cannot be ignored anymore. Therefore a proposal of rent to ownership policy is being derived by VITTI Sthapati Brindo Ltd, which introduces a scheme that show, a regular slum dweller can afford a dwelling unit with standard living facilities within affordable rent. The data clearly confirms the investors return of investment in 10 years including interest while the tenants procure ownership of their dwelling unit.

This continuous deprivation of the urban poor to attain the basic urban facilities has led to the realization of affordable and sustainable urban housing prospect. With the mission of fulfilment of social obligation by extending support to low-income group in achieving a desired living standard, Vitti has developed this socially sustainable and economically viable infrastructure of a housing compound.

Sustainable Development Goals, Environment and Youth of Bangladesh

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The idea of the Sustainable Development Goals (SDGs) has gained attention because of the growing urgency of sustainable development for the entire world. Humanity faces many overlapping crises of environmental sustainability, including: climate change as the result of human-caused emissions of

greenhouse gases; massive environmental pollution (eg, the poisoning of estuaries and other ecosystems as a result of heavy runoff of nitrogen-based and phosphorus-based fertilizers); the acidification of the oceans, caused mainly by the increased concentration of atmospheric carbon dioxide, which is the most important human-produced greenhouse gas; the massive loss of biodiversity caused by unsustainable demands on forests (eg, logging for timber or wood fuel) and the continuing conversion of forests and remaining wilderness into farms and pastures; and the depletion of key fossil resources, including energy (oil, gas, coal) and ground water. The public is beginning to sense that the increasing frequency of extreme climate events is indicative of an underlying dangerous trend of long-term change.

Youth is the spring of Life. It is the age of discovery and dreams. The youth hopes for a world free of poverty, unemployment, inequality and exploitation. Around 47.6 million or 30 percent of the total 158.5 million people in Bangladesh are young (10-24 years) (Census, 2011). 'Demographic dividend' at present provides an opportunity to Bangladesh to make use of its working-age population for productive socio-economic activities. Young people can play an active role in protecting and improving the environment. The SDGs cover a wide range of issues and youth monitoring of these goals is a critical part of ensuring their success (UNESCO, 2016). The role of youth is of most importance in today's time. It should become aspiring entrepreneur rather than mere workers. Young participation is important because youth are the country's power. They can change their lifestyle, they can make their homes, schools and youth organizations more environmental friendly by adopting environmental friendly practices, recycling of different materials as well as preserving resources such as water and electricity.

Engaging youth in environmental protection not only creates direct impact on changing youth behaviours and attitudes, but possibly influence their parents and relatives. For example youth can learn about health and sanitation, and take precautionary measures to avoid the spread of disease, as well as teaching these measures in their communities which is related with SDG 3 or

youth can organize local campaigns to reduce deforestation and can organize tree-plantations with indigenous varieties of plant life which is focused on SDG 15.

It is time for the youth to have full understanding about SDGs and at the same time they have to acquire knowledge and skills and empowered about their roles and responsibilities to protect the environment of Bangladesh.

Temporal Urban Vegetation Mapping in Rangpur Sadar Upazila, Bangladesh using Landsat Imageries

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Rapid Expansion of the urban area is one of the major obstacles for the consistent development of the cities in Bangladesh. Increasing population, unplanned urbanization process and conversion of bare forest land to human settlement creates significant adverse impacts on the sustainable environment and ecosystem. A sustainable urban design always requires a proper management plan. In this paper, a set of multi-date Landsat imageries of 1972, 1989 and 2014 was used to assess vegetation change mapping of Rangpur Sadar Upazila. This 42 years Landsat data reveals that about 1297 hectare vegetation areas changed from 1972-1989 year period, 5984 hectares from 1989-2014 year period and 7281 hectares from 1972-2014 year period. Moreover, a significant area of vegetation has been reduced from 1972-2014 declining from 39% of the total area to 17%. A regression analysis between the urban population and extracted vegetation area shows

a robust relationship at R2 0.94, which means that the population has a direct influence to decrease vegetation in the city. The overall vegetation classification accuracy was 95%.

SDG -16 is an Enabling Goal That is Interdependent in Which Other Goals Cannot be Realized Without Achieving Goal - 16

Zakir Hossian

Chief Executive, Nagorik Uddyog

The SDG 16 known as justice and governance, or peace, human rights and democracy is cross-cutting as well as an enabling goal that is interdependent in which other goals cannot be realized without it. The SDG 16 is one of the key factors that makes the SDGs different from the MDGs. SDG 16 is one of key goals that many members have been advocating for in the post-2015 development agenda-setting process. The 2030 agenda responds to a critical gap of MDGs implementation, namely the absence of an explicit recognition of the critical importance of governance and institution- building is key of overall development and upholding human rights. The goal 16 commits ‘to promote peaceful, inclusive societies for sustainable development to provide access to justice for all and build effective, accountable and inclusive institutions at all levels.’ Peace specifically identified as one of the five pillars on which the agenda 2030 is grounded. Goal 16 underpins rest of the goals that institutions that are capable of responding to the needs of the public transparency and accountability. To ensure an enabling environment in which people are able to live freely, securely and prosperously is shown throughout the goal 16 targets.

Climate-Resilient Village Development (CRVD): A Democracy and Community Building Tool for Food Security and Women's Equality in Bangladesh (Addressing Goal 12)

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The proposed paper relates to Goal 12 of the 8 goals said to be the most relevant to environment. The paper will also be correlated to some other relevant goals other than Goal 12 itself. Any consumption-production economy, usually, is infested with the 'Small Fish-Big Fish Symptoms', unless extreme care is taken in order to shun this symptom. Besides, embedded human nature of tendency to maximize personal profits often overrides felt need for environment-friendliness. The proposed paper aims at reducing poverty among both 'ultra poor' and the 'poor'. The Objective are to carry out a real-life experiment on Climate-Resilient Village Development (CRVD) as a participatory model for analysis, diagnosis, design, implementation, and evaluation of cooperative livelihood enterprises - owned and governed by the vulnerable village people themselves - with an eye on the prize of food security and women's equality on the reality ground of climate variation and change in Bangladesh. Making village people and local development institutions work to take on the challenge of fending for their own climate-resilient livelihoods and the goal of food security and women's empowerment. To address numerous reasons opposing motivation to work for common good, Producers' and Consumers'/Sellers; will be formed separately. Separate groups of Small Farmers, Women Farmers, Landless Farmers, Farm Workers, and Micro Entrepreneurs- working for climate-resilient livelihoods and food security; and village Consumers, Small Farmers, Women Farmers, Farm Workers, Non-Farm Workers- for their own social and economic empowerment.

Make Cities Sustainable: Role of Urban and Peri Urban Agriculture (UPA) in Achieving Sustainable Development Goals: A Case of Dhaka City, Bangladesh

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The urban population in 2014 accounted for 54% of the total global population— more than three billion people - exceeds the number of those living in rural areas. According to UN projections, by 2030, some two thirds of the world's people will be living in cities. Currently, one third of city dwellers, one billion people, live in slums. However, 34.2 % of the Bangladesh population is urban in 2014, Dhaka, the capital of the country (N 23°22'30" to 24°22'20" , E 89°41'6" to 90°21'23"'] with an area of 1463.60 Sq. Km, according to 2016 data of population of 12 million, the population density being 8229 per sq. km. (2014) but, by this time population estimated as 15.6 million with density 112,700 per sq km. As the population is growing at an alarming rate, by 2050, will be the third most populous city with about 35.2 million residents. Recently, Dhaka has been ranked as the fourth least livable city among 140 cities surveyed by the Economist Intelligence Unit based on thirty factors. Our national population growth rate is currently 1.37 percent, rate of internal movement 4.5 percent, but the rate of migration to Dhaka is 6 percent which is unimaginable, moreover majority of migrated people is poor. UNDP (1996) has recognized urban and peri urban agriculture (UPA) having the potential to bring about positive socio-economic development in urban areas of the developing world, an important role in pursuing the Millennium Development Goals eg MDG 1 and 7, related to poverty reduction, food security, and environmental sustainability. The contributions of UPA related to Sustainable Development Goals (SDGs) can be identified as Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable; Goal 01: End poverty in all its forms everywhere; Goal 02: End hunger, achieve food security and improved nutrition and promote sustainable agriculture; Goal 12:

Ensure sustainable consumption and production patterns. Urban and peri-urban agriculture (UPA) can be defined as the growing of plants and the raising of animals within and around cities. Urban and peri-urban agriculture not only provides food products from different types of crops (grains, root crops, vegetables, mushrooms, fruits), animals (poultry, goats, sheep, cattle, pigeons, fish, etc.) but also non-food products (e.g. aromatic and medicinal herbs, spices, ornamental plants, tree products). UPA includes trees managed for producing fruit and fuelwood, agroforestry and small-scale aquaculture. A recent survey made in the urban and peri-urban areas of Dhaka city demonstrated how urban and peri-urban agriculture (UPA) can, in different environments, play a key role as a source of employment, income and food which are the indicators towards poverty reduction and improved food security helping to attain SDGs in several sectors.

Metal Pollution Monitoring in Rivers, Estuary and Coastal Area Of Bay of Bengal, Bangladesh (Chittagong) and Possible Impacts on Water Quality, Biodiversity and Public Health-New Knowledge and Information

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The “Artificial mussel (AM)”, is a novel and innovative passive sampling technology, which can provide a time – integrated estimate of metal concentrations in the coastal, marine and fresh water environment and recycled water, treated waste waters, ground

water bores, rivers and irrigation channels and heavily polluted water where aquatic biodiversity can not survive. The AM technology was used for the first time in river and coastal water of Bangladesh to monitor and assess the risk of targeted trace metals to water quality, biodiversity and human health. During Phase-1 of this study, AMs were deployed at eight sites within the Karnafully River and adjacent coastal area of Chittagong, Bangladesh. Results of Phase-1 showed the accumulation of eleven metals in AM including Zn, Pb, Cd, Ni, Hg, Cu, Co, Cr, Fe, Mn and U throughout the six months study period from June to December 2013. The order of accumulation of metals in AM was as follows: Fe > Mn > Zn > Cu > Hg > Ni > Pb > Cr > Co > U

This study compares time-integrated level of eleven trace metals (Cd, Co, Cr, Cu, Fe, Hg, Mn, Ni, Pb, U, Zn) in Halda River, Karnafuli River, Karnafuli River estuary and coastal area of the Bay of Bengal, Chittagong, Bangladesh. Through this study, “hot spots” of metal pollution were identified. The results may demonstrate that the Halda River, Karnafuli River, Karnafully River-estuary and adjacent coastal area of Chittagong, Bangladesh are highly polluted by high risk metals (cadmium, chromium, copper, mercury, nickel, lead, uranium). Agricultural, domestic and industrial wastes directly discharged into the waterways have been identified as the main causes of metal pollution in Chittagong, Bangladesh. The high level of metal pollution identified may impact on local water quality, and seafood catch, livelihoods of people and public health resulting from seafood consumption. There is a need for regular monitoring to ascertain that local water quality with respect to metal levels are within the acceptable levels to safeguards both environmental health and public health.

Sustainable Development: A Case Study of Chandpur Pourashava Area

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Chandpur Pourashava is experiencing a rapid growth in urbanization. This increasing rate of urbanization has created many problems because the urban areas here were not planned. As a result sustainable development is not adopted in Chandpur Pourashava. But in recent years sustainable development is to define viable schemes combining the economic, social, and environmental aspects of human activity. The ‘sustainable city’ plan encourages a re-think of urban planning, housing, energy, transport, etc. The study is to find out how the existing master plan of Chandpur Pourashava fulfills the purpose of the Sustainable Development Goals (SDGs). This study is the inclusive method considering physical and social environment protection, economic development and social development as well as the cultural dimensions of Chandpur Pourashava area and its potentials and constraints to the development aspects for future development of the area. The proposed master plan of Chandpur Pourashava does not cover the sustainable development. Many concerned environmental issues should be considered. This study will help Chandpur Pourashava to be a sustainable city in near future by continuing economic development, social development and environment protection. As a result, this need a multidimensional and multisectoral approach which can narrow the sustainable development gap between all the region of Chandpur Pourahava’s area for improving the overall living condition and improvement of the quality of life.

Agro-forestry for Climate Change Adaptation: An Option for Salinity Affected Coastal Farms of Bangladesh

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Agriculture with trees, referred to here as agroforestry, is a landuse option and policy strategy to address the issues of global food production per unit area; reduce the vulnerability of agricultural systems to climate change; and reduce greenhouse gas emissions from agriculture. Agroforestry, the inclusion of woody perennials within farming systems, is both a traditional landuse approach developed by subsistence farmers throughout the tropics, and a livelihood option promoted by landuse managers and international development agency such as World Agroforestry Centre based in Nairobi.

Trees on farms help adapt to climate change by reducing vulnerability to climate impacts and enhancing the resilience of farming systems. Reducing vulnerability also means the ability to generate more income and hence raise the adaptive capacity of smallholders. A preliminary analysis of the spatial distribution of existing agroforestry systems shows a wide potential for increasing tree cover on agricultural lands and rangelands. Diversification of food and livestock production is a key strategy to increase food security and socio-ecological resilience for climate vulnerable farmers and herders. Agroforestry systems, and the planting of trees, are long term landuse decisions, and their success is dependent upon a array of choices from species selection to management approaches, specific technological knowledge, agronomic practices, and a locally specific enough knowledge base to be ecologically and socio-economically relevant to the specific local conditions of farmers, communities, and other actors.

The overall aims of this project are to develop and investigate a generic community-based and transferrable methodology for the generation of hybrid knowledge and adaptation options, which is applicable to coastal farmers and communities affected by salinity due to storm inundation and sea level rise in the era global warming. And, these can be used by communities to select, evaluate, adapt, and modify agroforestry approaches and technologies to local and community conditions in coastal farms of Bangladesh.

Water and Sanitation Facilities in Poor Urban Neighborhoods of Dhaka City: A Study on Slum of Mirpur Area

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Around 50 million Bangladeshis live in urban areas, and this number is set to rise to 83 million by 2030. In the capital Dhaka, 80% of residents live in informal, often illegal settlements densely packed communities, prone to flooding, with no proper toilets or running water, and where raw sewage drains directly into rivers. Bangladesh's cities are already unable to cope, but climate change is set to make the problem much worse over the coming decades, as will millions of people migrating to the cities (WSUP;2016). Due to low-lying elevations and dense population Bangladesh is considered one of most vulnerable countries in the world to the impact of climate change. The challenges posed by climate change and growing economic development require that the quantity and quality of water resources in Bangladesh be managed by sustainable development policies. Without such a plan, Bangladesh will continue to face serious challenges to achieve

economic growth to support the growing population confined in a densely-populated land with declining water resources. The water and sanitation services in the poor neighborhood areas like slum are in a serious shortages and thus without providing better facilities in these areas and specially without bringing the low income group of people under the shadow of SDG then the fuller results won't be achieved. For this paper a slum named Bauniabad located at Mirpur, is considered as the case where it has been observed that the slum dwellers are facing serious shortage and scarcity of water and they are using the unhealthy sanitation as a result most of the time they have to suffer for different types of water born diseases and odor pollution thus counting their days in vulnerability. This paper will focus the fact of attaining goal no. 6 of SDGs from Bangladesh contexts and hence will provide recommendations to adjust the water and sanitation facilities in poor urban neighborhoods of Dhaka city in Bangladesh.

SDG 13: Combating Climate Change

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To combat climate change we need to understand the dynamics of how and why climate is changing and affecting the globe. The shape of the earth, the atmospheric layers and the dynamic interactions between and within these layers, the Sun and its radiations, topography of different geographical areas of the globe, in particular the forests, highlands and the seas and the differential impacts of the different greenhouse gases, that depend on human consumption pattern, need to be understood adequately and accurately. For example, the shape of the earth, its elliptical axis and tilting of its poles towards and away from the Sun, while

rotating on its axis and also the differential width of the atmospheric layers at the poles and at the tropical region, have different degrees of solar heat absorbed at the poles and at the Tropics with different impacts on the earth's surface and thereby effect on snow cover of the earth's surface, where it is flat, and mountainous heads, based on where these are situated. Highland is also closer to the Sun and hence have less protective layers of the atmosphere to cover it, the consequences are clearly evident. The effect of solar radiation and GHG on the seas, and how the seas and the forests absorb and dissipate the absorbed GHG and heat need to be understood to combat these.

Combating climate change will be basically two faceted- prevent any further escalation or reduce emission of GHG and strengthen resilience to manage the impacts of climate change. While reduction and or prevention of further escalation of GHG hinges largely on political commitment, supported by reduction in individual and corporate consumptions of hydrocarbons, that other-wise is needed for a comfortable life and big business margins, adapting the impacts of global warming particularly by the most vulnerable has to be a combined effort, to be lead by the State for the sake of welfare of its marginalized people, who on their own are helpless bystanders but are affected the most seriously. General understanding and consensus needs to be built up, because in the long run climate change will not spare anyone and will suck up everyone's economic development and lifestyle gains.

Mitigation of GHG emission would require that everyone reduces energy consumption actively (reduction through, for example, controlling volume of water used for bathing washing etc); recycling wastes, e.g., using waste water from bathing to watering plants; reuse goods, e.g., cans and containers, glasses and plastics etc. At domestic and industrial level mitigation may be brought about by changing sources of energy, e.g., from hydrocarbon/ carbon derived energy to solar panel. wind-power and hydropower generated electricity.

The question of adaptation comes as an aftermath measure or

through planning to face off climate related devastation a priori. This in fact is to enhance the resilience and skill of all the stakeholders in the relevant areas, which would require training, orientation, communication, development of weather warning system, efficient transportation, e-health measures, seashore dykes, efficient handling of food consumption and efficient management plan to address the devastation of a climatic event.

Injecting Community Parking to Improve Existing Urban Environment of Planned Residential Areas in Dhaka

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Our children have forgotten that playing is not only virtual because of lack of play space; we have forgotten that bonding is possible not only through social networking due to absence of communal gathering spaces; eating out is currently our major means of social entertainment; we reach our home from work every day after endless wait in the traffic of Dhaka only to be greeted by the dark & pseudohaunted parking spaces with rows of mythical creature like vehicles hiding in the shadows at the ground level of our multistoried apartment buildings. We so frantically choose to overlook the parking space running as quickly as possible to take the elevator or stairs to our “sweet home”. With minor variations in the previous description this is mostly the routine story of the privileged habitants of “planned residential areas” in Dhaka like Dhanmondi, Banani, and Uttara etc. Apart from the decent address line and stacks of residential units with utility services these areas are currently riddled with loads of problems and in many cases fail to provide basic urban & social requirements of the inhabitants. Lack of play space,

unbearable traffic congestion due to road side parking, absence of uninterrupted pedestrian facility, lack of community gathering or informal activity space etc are currently some of the major urban problems for the residents of these areas. Will it not be amazing if we could eliminate or at least minimize quite a good number of these major problems with relatively reasonable policy and implementation that is feasible in current context? Let's see how introduction of community parking facility in the existing planned neighborhoods with few revised policies can positively contribute to the improvement of current urban environment.

Energy Challenges for a Changing Bangladesh

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Bangladesh stands at a cross road of transition from an underdeveloped to a more developed energy and power sector. Major hubs of power generation plants fueled by coal are going to visibly change the skyline of power and energy scene in the country. This will be part of a major transition from a long drawn gas based mono energy status of the country to a multiple energy mix including coal, gas, NLG, oil, nuclear, cross bodere power and renewables notably solar.

A major challenge presently faced by Bangladesh is to ensure primary energy supply in order to run the mega scale power projects and fast growing industrial installations. In the face of a fast depleting gas reserve and a lack of initiative to develop local coal, achieving a sustainable local primary energy source becomes increasingly hard. A consequence of the above will be an increase of dependence on imported energy. The present one million ton per year local coal production is likely to change to a mostly imported 35 million ton per year activity by 2030 as many large coal based power plants will be in operation. Historically Bangladesh has insignificant carbon foot print and the above

would not largely change that status compared to what major coal using nations including neighboring India and China practise. However use of large amount of coal for power generation very close to ecologically sensitive world heritage site Sundarban will have serious negative environmental effect. The UNESCO, the local and international scientists and environmentalists have raised the issue to suggest the government to scrap Rampal coal power plant near Sundarban.

Import of costly LNG to overcome the immediate gas deficit (500 to 600 mmmcf) appears justified, but the merit of planning a very large scale LNG import as a sustainable energy feed for a cash strapped Bangladesh is debatable. A rightful alternative is to launch serious gas explorations both onshore and offshore. Establishing a very costly Rooppur nuclear power plants in a thickly populated highly fertile alluvial plain is perhaps more of a prestige than practically beneficial. Furthermore the issue of handling the spent nuclear fuel tend to make it controversial because of the fact that neither Bangladesh has any experience of using or disposing off nuclear material, nor is Bangladesh a suitable place to dump nuclear waste.

Renewable solar energy has good prospect in Bangladesh for two reasons: enough sunshine and a decreasing trend of cost for its generation. From the Indian experiences solar is likely to have better chance of taking more share in the energy mix in Bangladesh. Cross border electricity import from India has potentials to grow from present 600 MW level. In the long term future Nepal and Bhutan may source major hydro electricity to Bangladesh. Bangladesh should also keep an open eye for gas import, either from Myanmar or through the IPI or TAPI projects should these be implemented.

Economic Benefits of an Eco-Town for Slums in Dhaka City of Bangladesh: An Application of Discrete Choice Model

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Environmental changes in general, and those associated with climate change in particular, are increasingly recognized as growing drivers of establishing the slums. Climatic victims are come forward to slums of major cities of Bangladesh for resettlement. They have no job opportunity and led to substandard life under the surrounding urban environment. Urbanization in general are frequently blamed for greenhouse gas (GHG) emissions and hence for climate change. From the production perspective, if cities concentrate energy intensive production, this will push up their average GHG emission per person. In addition, unplanned waste management and sanitation of slums pollute environment in several ways. Greater congestion of slums has already led to severe health and security problems. As a result, poor slums dweller becomes poorer. Eco-town led green growth plays an important role to get rid from these unexpected environmental hazards and enhance job opportunity and improve the livelihood condition of slums dweller. This study carried out through questionnaire survey in the major slums of the Dhaka city and attempts to apply choice experiment approach to assess consumer attitudes, that is, the preference and willingness to pay (WTP) for establishment of attributes of photovoltaic (PV) system, improved sanitation, waste collection, and household biogas plant at different levels of Eco-town for environmental changes and livelihood diversifications. Random Parameter Logit and Multinomial logit models are used to quantify the slums dweller performance for the attributes of Eco-town. Attributes of photovoltaic (PV) system, improved sanitation, and waste collection, educational attainment, and age are found statistically

significant and positive. The estimate of WTP on photovoltaic is higher than the WTP on other attributes in the study area. The findings in this study provide robust basis for both policy makers and government to make more specified policies to make a low carbon society and poverty eradication in the urban slums.

Transformation of Waste into Energy in the Pabna Municipality Area of Bangladesh: An Economic Valuation

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Waste is a part of the natural environment but it is becoming a serious issue in any municipality areas. Like the other Municipality areas, Pabna has been experiencing rapid population and economic growth which led to unprecedented levels of consumption and consequently, waste generation. Pabna is facing waste management crisis. Conditions and resources for waste management are severely strained in this city. As societies become more affluent and urbanized, communities become more congested and waste composition becomes more complex which make it problematic to continue dumping because it now leads to negative impacts on human health and environment. As a common scenario of waste mismanagement and negative environmental impacts from the landfilling by waste in Pabna city, it is essential to reduce GHGs emissions from landfilling and development of renewable energy supplies that are drivers for alternative waste management strategies. This study sets its objectives as assess the perceptions and preferences for waste management in Pabna, evaluate differences between landfilling and Waste-to-energy (WTE) in terms of economic and environmental costs and benefits and explore the range in parameters that support the feasibility of WTE. This study carried out both the secondary data and household interviews (n=301), followed by a structured

questionnaire and used cost-benefit analysis and sensitivity analysis to generate empirically supported assessment. Provision of tipping fees, waste tax, willingness to pay for waste collection and electricity bill for using electricity generated from the waste can help to improve transformation of waste into energy project in the Pabna city. This study considers specific and relevant transformation ways of waste into energy to generate empirically supported explanations, identified negative impacts of open dumping of waste and formation of waste policy in the Pabna city of Bangladesh. The findings of this study will provide a robust basis for policy makers, planners, researchers, government and development partners for further research, project implementation of transformation of waste into energy, developed specified policies to lessen the emission of GHGs, building a resilient and sustainable waste management and establish a low carbon society.

WaterAid Bangladesh Position: Reaching the SDG in WASH

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The adoption of the Global Goals marks a paradigm shift in development. The Global Goals acknowledge the complex, interlinked nature of development challenges compared to the more straightforward and linear Millennium Development Goals.

In particular, SDG 6—ensure availability and sustainable management of water and sanitation for all—places WASH in a much broader framework compared to the MDGs, bringing in issues of hygiene, water quality, efficiency, management, ecosystems, and community and international involvement.

In order to address these challenges and achieve access to improved water, sanitation and hygiene for everyone, everywhere

by 2030, WaterAid Bangladesh is working on multiple dimensions, including integrated programming that addresses multi-sector WASH issues, such as in health and education considering equity and inclusion; as well as advocacy and monitoring. This paper provides a brief overview of the Global Goals, particularly Goal 6, in the Bangladeshi context, and how WaterAid Bangladesh is contributing to national progress on WASH in this changed paradigm.

Sustainable Development Goal and the Context of Marine Ecosystem of the Bay of Bengal

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Bangladesh is fortunate enough to have an extended coastal zone of unique geographical and environmental settings, and also the resourceful Bay of Bengal in its south. The over exploitation of coastal resources and unplanned human interventions of natural system have already created many environmental, and socio-political crises in this zone. However, after the peaceful settlement of maritime boundaries with Myanmar and India, Bangladesh now has a well-defined maritime territorial limit and a sizable exclusive economic zone (EEZ). As a result, the scope of exploitation of marine resources has increased many folds, although till now Bangladesh has hardly achieved any noticeable progress to make inventory of its marine biological and non-biological resources. Despite immense political commitments from the Government, the policy guidelines, institutional settings and technological capabilities are not yet adequate to harness the opportunities of blue economy as a major source of GDP. There is a need of national consensus on policy guidelines and to explore and extract the hydrocarbon from the

Bay of Bengal. The pollution of the Bay of Bengal, both from point and non-point sources, is already an important issue and a concern to the academics, policy makers and other stakeholders. The environment of both the inland and coastal zones have already become fragile and have been degraded significantly. We have very little progress to protect and conserve the sustainability of these ecosystems. Realizing the situations, before massive scale interventions are made to explore and exploit the natural resources of the Bay Bengal, it is an immediate need to develop policies and guidelines for a sustainable utilization of those resources. Otherwise the future marine environment will also face the same fate, as has been experienced in the main lands.

Study of Association of FTO Gene Risk Variant with Type 2 Diabetes Mellitus in Bangladeshi Subjects

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Type 2 Diabetes Mellitus has recently skyrocketed to become one of the leading causes of mortality worldwide. Particularly our population, with a milieu of metabolic obesity, and a drastic switch of lifestyle, is at the epicenter of the emerging epidemic. Therefore, identification of the molecular risk factors, along with their effect specifically on our population is strongly merited. Since predisposition to T2DM is inherited in most cases, and lineage studies and associations studies further underlines the connection, T2DM ought to have a genetic basis. So far, T2DM has been traced to a sweeping number of genes. The study interrogated SNP rs9939609 linked to altered expression of FTO, a gene directly connected to obesity. The SNP's association with T2DM has been validated in other population studies. But the degree of the association may vary due to population-specific

variants in metabolism, anthropometry and demographics. 44 non-diabetic and 101 diabetic patients were randomly enrolled as subjects of the study. A detailed structured questionnaire was developed and completed for the patients and the control. It documented assessments and measurements of socio-demographic, anthropometric, potential risk factors, clinical status, pathological co-morbidities and management strategies for the T2DM patients. DNA was extracted from blood samples using ATPTM Genomic DNA Mini Kit following manufacturer's protocol. The concentration and purity of the extracted DNA were assessed spectrophotometrically. Next, Allele-specific PCR was performed. The amplicons generated from the PCR reactions were run in a 1.8% agarose gel. The genotype was determined next by comparing between the electrophorograms of each of the duplex PCR in 1.8% agarose gel. Association of specific alleles with diabetes, gender, complications, BMI range, obesity status, sBP and dBP were analyzed using statistical software GraphPad Prism version 7. Comparison of genotypes between control and patient, association with gender, association with post-diabetic complication and obesity status were analyzed with Two-Way ANOVA. Systolic and diastolic blood pressure and BMI range was analyzed with One-Way ANOVA. The study shows a moderately significant association of the risk allele of the FTO SNP rs9939609 with T2DM was found ($P=0.0578$). The significance of the association disappeared in the recessive model ($P=0.02921$). The P values were much lower for females (0.0067) than in males, even after being increased in the recessive model ($P=0.0613$). The patients exhibited significant association attributable to the genotypes in the multiple comparisons when subdivided gender-wise. This suggests that the women are more predisposed to develop T2DM in South East Asia, which is aligns with some previous studies. A remarkable finding of this study is that all pathological complications T2DM that were tested were found to have strongly significant association with this particular SNP ($P<0.003$ for all complications). The reason is perhaps that FTO susceptibility allele is predisposes an individual to T2DM through obesity. And a plethora of disorders and complications can be traced back to

obesity. When BMI groups were analyzed for the association with rs9939609, BMI was found to be associated in both genders ($P < 0.001$ in females and $P = 0.0042$ in males). However, the only the female subjects retained the association in recessive model ($P = 0.0173$). The multiple comparison of the female category also yielded significant association. No significant association was found with systolic or diastolic blood pressure. It can be concluded that T2DM is not the effect of a single cause, but an array of genetic and lifestyle machinations together act as fulcrums. This study provides insights in several facets of the condition of our populations.

Socio-economic Conflict between Farmer and Fishermen Group to Extract Water Resources at the Chalan Beel Region in Bangladesh

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Among different hard-to-reach agro-ecological zones in Bangladesh, a part of greater Chalan Beel has been selected as the study location. The Chalan Beel was once the largest Beel in the northern Bangladesh. It consisted of a series of Beels connected to one another by various channels to form a more or less continuous sheet of water during the rainy season. Like this way, Beel Chiroil is a part of greater Chalan Beel which is located at the Chatmohar upazila of Pabna district in Bangladesh. The study was carried out with the objectives: i) to understand the present livelihood pattern with seasonality and socio-economic conflict in the Beel Chiroil region and; ii) to identify the existing cropping practices and their risks and vulnerabilities on agriculture. For the study several field visits and surveys have been conducted to collect qualitative and quantitative data by using different tools: including Participatory Rural Appraisal (PRA), Focused Group Discussions (FGDs) with

active participation of multi-stalk holder in both beneficiary groups (farmers & fishermen) and key informant interviews (KIIs) from different key personals in relevant sectors. A coded interview schedule with a good number of questions including multiple options has been developed by multi-disciplinary experts of the study team. It is designed to collect detail household information on demographic, socioeconomic, food security, farming activities, household income & expenditure, occupational information etc. The study revealed that the socioeconomic condition of the people in the region mostly depends on agriculture, which is hampered due to natural calamities and man-made interventions in Beel Chiroil area. The study also identified several problems at community level as reported were: sudden floods, the unavailability of irrigation water from the River Baral, the decrease of siltation over the agricultural lands, drainage congestion resulting in decrease of cultivable lands, the shortage of water in the agricultural sector, agricultural land erosion and sand deposition; the reduction of depth of rivers, canals, joins etc; navigation problems in marketing of agricultural products, the decrease in agro-industries, the decrease in natural fertility of agricultural lands due to the use of chemical fertilizer, pesticides etc.; water pollution and decrease in quality of jute; decrease in production of rabcrops and vegetables; the decrease of pasture lands and animal food; the decrease of unemployment in the agricultural sector and the resettlement problems of the farmers.

Conservation and Sustainable Use of Oceans, Seas and Marine Resources

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The aim of Blue Economy (oceans, seas and marine resources) models are to shift society from scarcity to abundance – based on

what we have, and to start tackling issues that cause environmental and related problems through novel ways.

There is huge potentiality of marine resources all over the world. Sustainable use of marine resources may ensure the affordable and low cost in export, import related business which transports their products through oceans, marine and sea level.

This research paper elucidates the potentiality of using marine level for transporting products in the business purpose rather than road level. There explains benefit of using marine level as the mode of transportation with the comparing road, its constraints, which steps must be taken to remove these constraints.

Sustainable Transport Mode and its Potentiality: Bangladesh Perspective

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For industrialization in Bangladesh or for the smooth functioning of an organization distribution system must be cost effective and smooth. The shipment of raw material, Work in progress or finished goods must be required for the very existence of an organization. There is a several modes of transportation but recently the concept of Blue Economy (oceans, seas and marine resources) models unveiled the secrets of scarcity to abundance. There is huge potentiality to get benefits by using the blue economy concepts specially in the transportation sector. This research paper elucidates the potentiality of using water ways for transporting products in the business purpose rather than road and rail ways. In this paper, we tried to explain applications potentiality, constrains and provided some recommendation for overcoming the problems enhancing the use of water ways as an sustainable transportation mode in Bangladesh perspective.

Water and Sanitation Management for Slum Dwellers

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Water is one of the most important ingredient in our everyday life and proper sanitation ensure the freshness of life. As like other basic needs, we should give the same value to water and sanitation management for leading a disease free life. Due to lack of proper management of water and sanitation millions of people are attacked by water related disease in each year. Increase industrializations pollute water by wastage of industries day by day. Developing countries like Bangladesh, people are facing terrible problem due to unavailability of safe drinking water supply and well sanitation crisis. This scenario is very terrific in mega city like Dhaka, especially for the growing low income community including the slum dwellers. In this paper, we discussed, the present scenario of water and sanitation status of slum dwellers & ways how they purify water and suggested some sustainable ways to minimize the scarcity of water in order to improve their living standard.

Green Waste Management: Progress and prospects in Bangladesh Perspective

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Everyone is aware of the limited resources of this planet. But there is no limit of the peoples wants, It is the time demand situation to use this resources in efficient and managing the waste in a productive way. Hopefully a lot of research is going on this particular issue. Green waste management becomes popular day

by day. Practices of green waste management are burning issue for sustainable economical development in all over the world. The purpose of this research is to evaluate and analyze of prospects, progress of green waste management in Bangladesh perspective.

Solar Energy: Potentiality and Implementation Problems in Household and Business Sectors in Bangladesh

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The requirements of electricity in the world including Bangladesh are rising at an alarming rate and the power demand has been going ahead of supply. It is also now widely recognized that the fossil fuels (i.e., coal, petroleum and natural gas) and other conventional resources, presently being used for generation of electrical energy, may not be either sufficient or suitable to keep pace with ever increasing demand of the electrical energy of the world generation of electrical power by coal based steam power plant or nuclear plants causes' pollution, which is likely to be more disastrous for nature. Because of that, it is time demand situation that we must go for an environment friendly energy that is green energy. The solar power generation is one of the most potential green energy for future generation in Bangladesh because solar sources appear here in all the year long. In this paper, we tried to explain the significance, applications potentiality, constraints to implement and provided some recommendation for enhancing the use of solar power in the house hold and business sectors in Bangladesh perspective.

Analysis of Some Financial Factors to Promote Eco-Friendly Business

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Practices of eco-friendly business are treated as the burning issue for ensuring sustainable environment all over the world. The purpose of this research is to evaluate and analyze some financial factors which may influence business sector to become environment friendly. Sustainable industrialization and foster innovation is defined as companies that attempt to establish and/or transform their business activities as eco-friendly. Acceptance of corporate social responsibility (CSR) and more businesses have been including the concepts of sustainability into their planned standing. This include the information of costs incurred and benefits realized as a result of implementing resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation for business practices. To explore the real scenario, the paper conducts with the help of structured questionnaire survey. We tried to show their (business) claims, significance, applications potentiality, constrains to implement and provided some recommendation for enhancing eco-friendly business and sustainable industrialization in Bangladesh perspective.

Making a Sustainable City: Problems and Solutions in Dhaka Perspective

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Cities are hubs for ideas, commerce, culture, science, productivity, social development and much more. At their best, cities have enabled people to advance socially and economically. However, many challenges exist to maintaining cities in a way that continues to create jobs and prosperity while not straining land and resources. The challenges cities face Common urban challenges & can be overcome in ways that allow them to continue to thrive and grow, while improving resource use and reducing pollution and poverty. The future we want includes cities of opportunities for all, with access to basic services, energy, housing, transportation and more. In the present paper, we want to identify some determinants that must have to address for a healthy city. We also identify some constraints and their optimal solutions for creating Dhaka as a sustainable city.

Sustainable Development Goals and the Tasks for Bangladesh

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In September 2015, the world community adopted the Agenda 2030 for sustainable development, formulated in the form of 17 Sustainable Development Goals (SDGs). Compared with the Millennium Development Goals (MDGs), the SDGs are more wide-ranging, covering and integrating the three dimensions of

sustainable development – namely economic growth, social development, and environmental protection – more fully. They offer more scope for individual countries to set priorities and devise strategies and policies. Implementation of SDGs therefore poses a more formidable challenge and at the same time can be more rewarding. How prepared is Bangladesh in dealing with this challenge? How has it done during the first year of the SDG period? What are the tasks for Bangladesh in future with regard to the SDGs? These are the questions that the paper will address. It is an overview paper, taking a broad look at the situation, issues, and implications.

Bangladesh has done relatively well in achieving the MDGs. It therefore has a good foundation for addressing the “unfinished MDG business” part of the SDGs. However, the salient feature of SDGs is inclusion of environmental objectives as separate goals and also as integral part of other goals. Bangladesh’s record in protection of environment is rather chequered. It is therefore likely to be challenging for it to meet the targets and expectations of SDGs. Several concrete dimensions of this challenge include: (i) ensuring sustainable management of water, including sustainable withdrawal and supply of freshwater and restoration of water-related eco-systems (SDG-6); ensuring sustainable, modern, and affordable energy (SDG-7); (iii) achieving 7 percent GDP growth while avoiding damage to the environment, i.e. decoupling of growth from environmental degradation (SDG-8); (iv) achieving sustainable industrialization and doubling the share of industry in the GDP, while protecting environment (SDG-9); (v) achieving sustainable urbanization and human settlement; (vi) ensuring sustainable consumption and production pattern (SDG-12); (v) combating climate change (SDG-13); (vi) ensuring sustainable use of seas, oceans, and marine resources (SDG-14); and (vii) protection and sustainable use of terrestrial eco-systems (SDG-15). Making the best use of global partnership for achieving SDGs (SDG-17) is also part of the challenge.

The paper provides an overview of the tasks that Bangladesh faces with regard to the challenges above. In doing so, the paper emphasizes the interlinkages among these challenges and the

opportunities of benefiting from adopting the “nexus or the nodal-point approach” that builds on these interlinkages. The paper illustrates this approach through the example of approach to rivers. It shows how a switch from the current Cordon approach to rivers to the Open approach can help to meet several of the challenges at the same time. The paper explores the possibilities of similar nexus or nodal approach in several other areas of SDG challenges.

Use of Black Soil (*Kasam Mati*) as Fuel for Adaptation to Climate Change

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Haor area in Sunamgonj district is a unique geomorphological feature, most part of which remain inundated throughout the year. The flood free zone of dry season is characterized by the occurrence of black soil (Locally calls *Kasam Mati*), overlaid by sticky silty clay of 1.5 to 2 metre thick. Such black soil of 1 to 1.5 thick is exposed in the submersive zone of the haor areas. The local people since historical past used to use such black soil for their domestic fuel, occasionally. However, in recent years due to scarcity of traditional fuels, such as cowdung, tea trunk, woods, kalmis etc. the underlying black soils are being commercially mined by some local business peoples. Such black soils largely being used as fuel by local restaurants and cottage industries. Although such soils are being use as part to adapt climate change as an alternative fuels but this is again increasing the green-house gases emission to the atmosphere. Moreover, the soil of the agricultural land totally being distorted during the mining process and is the cause of local land subsidence. Human induced subsidence of this nature lead to longer water logging in the area. This study at Sulla Upazila of Sunamgonj district clearly shows that dependency of

local people on black soil as alternative fuel has an increasing tendency in recent years. This is also a part of their livelihood at dry season especially for local poor women. However, the environmental effect such activities requires further investigation.

Services in Slums through Community Based Organizations in Dhaka City: A Pathway to Reduce Vulnerability

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Urban population is increasing rapidly in Bangladesh but service provisions for them are not going on as the need. A vast amount of this increasing population is ended up to slums every year that are migrated from the rural areas. It is continuing for a long time and concentrating more in Dhaka city for job opportunity than any other cities in Bangladesh. This city is facing burden of excessive migrants as well as hazards especially in slum areas. Hazards like fire, flooding, water logging etc. are very common in slums. Moreover, health problems from climate change effects as vector and water born diseases, extreme heat and cold related illnesses are also in the list of hazards. These circumstances make the slum dwellers life vulnerable but steps are very limited to increase the resiliency. Some initiatives have taken by the government and Non-Government Organizations (NGOs) to provide necessary services formally by participation of Community Based Organizations (CBOs) in slums. Three projects as Enhancing Environmental Health by Community Organizations (EECHO) and Economic Empowerment of the Poorest (EEP) namely 'Shiree' of Dustha Sashthya Kendro (DSK) and Urban Partnership for Poverty Reduction (UPPR) project under LGED, UNDP, UN-Habitat and Dhaka City Corporation have provided services

through CBOs. Besides these, other stakeholders are providing their services to slum dwellers in the conventional approach cooperating with CBOs. The objectives of this study are to know the urban poor community empowerment process in Dhaka city, to find out the provided services and the effectiveness of service provision through CBOs and to know the social relations of CBOs with service providing agencies and other social organizations.

In this study both of the qualitative and quantitative approaches have followed for data collection. Two slums have chosen as the study areas where three projects have provided services through CBOs. These selected slums are Kollyanpur Pura Basti in Mirpur Thana and Korail Basti in Banani Thana. The information and data of the provided services by CBOs has been collected by observation and interviews with CBO leaders and their group members in the community level. The activities of service providing agencies have known by interviewing related persons and also from annual reports, directories, project proposals, brochures, homepages etc.

The service provision by participation of CBOs have found effective and reduces vulnerabilities in various ways. Firstly, community empowerment decentralizes the power and raise awareness among slum dwellers which reduces corruption and mismanagement. Secondly, service provision e.g. infrastructure, social awareness, community development fund etc. have reduces vulnerabilities. Above all, an effective coordination among the CBOs, NGOs, government agencies, Civil Society Organizations and other social organizations make the slum improvement more sustainable.

Gender, Empowerment and Drought: Different Impact on Women and Men in Barind Tract in Northern Bangladesh

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Drought is an on-set natural disaster that has widespread consequences since decades in Bangladesh. This research has been conducted with the financial support of Gender Water Alliance (GWA), The Netherlands, to understand the impacts of drought on women and men and their empowerment process. Qualitative techniques and tools were used and triangulated to ensure the validity of factual information. Findings shows that the literacy rate is very low in study area; significant proportion did not get any opportunity to attend even at primary level. Since land ownership status is very low, many local peoples are involved in agricultural share cropping, leasing, laboring or doing joint venture farming. Almost all cultivatable lands remain unusable during drought, thereby pushing them to extreme poverty. Villagers perceived drought as a condition with non-availability of surface and ground water and rainfall, hot temperature, betray with nature, deforestation, dry wetlands. The frequency and intensity of drought usually ranged from February to May and October to mid- November; and adversely impacts on lives of inhabitants, ecology and environment, particularly all gender groups and their empowerment in different ways. Traditionally, women manage all water, food, sanitation, and hygiene related activities of the family. To maintain these duties, women often find themselves invulnerable situations such as having to face eve teasing, bad comments, and even sexual harassment. Some husbands also beat wives if water is not available in the house. In addition, adolescent girls were felt unsafe when they fetch water from long distance, some miss school for water collection and to avoid sexual harassment. When girls stay in the house being

dropout then parents consider this as burden and give marriage to her, which create further vulnerability for them. Some parents arrange early marriage of their sons to get dowry to recover drought crisis. Children, elderly people and physically challenged people are more likely to be affected by drought because of inability to care for them. They do not get sufficient nutritious food due to living with unhygienic conditions and expose to different diseases. The villagers hardly adopt with drought situation. Gender affects coping strategies, thereby performing women's and men's roles become even more challenging in extreme drought. Men are mainly engaged in assuring food security, and drought caused the limited scope of works and income, less wage and discriminated payment, increased loan with high interests. All resources deplete drastically, and thereby exposing villagers to different diseases and starvation. In this time migration rate increases sharply. When men migrate leaving their family behind, women and children feel insecure in their home. On the other hand, when women migrate then they used to face harassment and trafficking. Especially, the situation leads the poor and women in venerable position, and their empowerment process becomes at risk. It was found that economic empowerment varies among women, men and socially disadvantaged groups. Specially, women are neglected to access land ownership by existing laws of inheritance, patriarchal values and social practices. Majority of the villagers do not know where they can get information about agriculture and farming suggestions, water access or skill development support. Men and younger boys can move freely anywhere and can join any meeting or social networking events, but women are not. In addition, disadvantaged groups experience social stigma, insult and inferiority, because of their inability to bargain and raise voice. Most of the women and men do not possess physical empowering qualities and rights during drought. The dignity, right to safety, good sanitation and hygiene facility and security immensely challenge that people being less empowered in study area. All gender groups were facing economic, social, political and physical barriers when trying to protect themselves from drought, consequently living with a lowest scale of empowerment. So, survival strategy and initiatives

are not sustained in those areas as basic resources are scarce, thereby affecting both men and women who have differential needs in drought. These inequitable distributions of rights, resources and power as well as repressive cultural traditions and norms constrain the ability to take action. These issues need to be addressed for further development, planning and decision making process towards meeting some of SDGs targets in Bangladesh.

Effects of Perceived Crowding on Mental Health in Dhaka City

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The City Dhaka is presently considered one of the most densely populated living areas in the world which makes it almost intolerable for humans. Such situation of this City is to be considered to make it more harmonic and healthy. Therefore a study has been conducted whether or not perceived crowding effects on the mental health status of the people in Dhaka City. One questionnaire has been developed locally according to the conventional methods with its reliability and validity tests to measure the perceived crowding of the inhabitants in which, a) crowding perception, b) annoyance, and c) action tendency as conditions are evaluated separately on the four answering options (0, 1, 2, 3). Such three conditions are justified as three sensory thresholds. The crowding is also considered in two different ways as: i) street crowding, and ii) home crowding. Another questionnaire named General Health Questionnaire (GHQ-12) measuring mental health (MH) has been widely using in a variety of settings of Bengali version (Ilyas 2002). In this questionnaire 12 items are used on the four (0, 1, 2, 3) answering options (Goldberg, 1972). The questionnaires have been used on the two hundred participants in the Dhaka City. Purposive sampling technique has been used to collect data where, education, age,

gender and livelihood are considered. Study was typically correlational and comparing between street-crowding and home-crowding situations.

Results revealed that the mental health status found degrading in effects on the high level of perceived crowding ($p < 0.1$). But if the person perceives crowding less than that of the more which does not show any degradation of mental health status. Another result indicates that the home crowding situation is more responsible for effecting mental health than those of the street crowding situation ($p < 0.5$).

Sustainable Use of Terrestrial Eco-Systems

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Sustainable use of terrestrial ecosystems is the concern all over the world because of its severe deterioration has upset in many places the normal functions like delivery of goods and services. Bangladesh is one very vital example where crisis is not limited in any specific area, the terrestrial eco-systems or its function is jeopardized in most of the areas like water, forest, transport, road, health, hygiene, human habitation, wild life etc. With 160 million people, the country is lagging far behind the one who has unrestrictedly harvested the terrestrial natural resources and built up their fortune through industrialization. The impact of many of such Industrialization has led to the drastic climate change. Consequently, Bangladesh is one of the countries have been facing sea level rise along with many other accompanied problems. World communities have also felt the pinch for the cause of deterioration of natural resources and climate change impact. Of late it seems they are seriously taken care of sustainable use of terrestrial ecosystems and stress upon all including the most venerable one like Bangladesh to make sure

sustainable use of their ecosystem function like delivery of goods and services aim at achieving sustainable development goals by 2030.

Sustainable Management of Water and Sanitation

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Global water crisis due to multiple factors including population growth and their demand for modern way of living is worse than what we thought. The Conflict for water both nationally and internationally is already evident in some countries and in the future probability of conflict is alarming. Bangladesh with her peculiar water behavior, the water situation is horrible and because of this situation, the water management has become one of the most difficult task. Sanitation is one aspect of life that guarantees better living is absolutely dependent upon water management. Similarly, socioeconomic development is again dependent upon water not only for better living, the very survival of all living and non-living one also. That is all life forms or we may call diversified biological entities as well. All non living materials becomes useless such as functioning of industries, dehydration of all products besides cooking food staff etc. The Bangladesh situation is horrible because at one time, we sink in water, and at other time, we get dried. Neither of the two is well manageable. Rather, this management has introduced a control system by violating the law of nature and that is developing some other problems.

This is not the end. The water when available is safe to use, is safe to drink, if safe is accessible? In fact, in the recent past, the safe water was a free commodity. Of course, in comparison to many other developing countries, has developed appreciable success in the field of drinking water and sanitation. Because of alarming deterioration of water availability, the success in this respect is under threat particularly fall of water table in the lean period.

In the age of developed science and technology, Bangladesh with her qualified human resources are not scared of any adverse situation, mentally and physically bold enough to overcome any adverse situation like disaster management. What we need to do is to identify the actual problem and develop appropriate strategy to attack the problem. We have trans boundary rivers that carry huge water to our land when our land and man are over soaked, over saturated with our heavy rainfall. The world renowned Himalaya is the watershed that normally used to regulate water conservation and discharge . Unfortunately Himalaya is overused, abused by deforestation, soil and soil humus loss and consequently temperature rise. To regulate water conservation and discharge, a regional cooperation is a must besides proper land use of the country along with its water soil and man.

World Communities appear Co-operative and so in harmony with them, effort should be made to achieve the goals. The time schedule for achieving SDGs by 2030 appear difficult . In fine my suggestion would be something as follows: For Himalayan watersheds, take proper measures for storage as well as drainage of excess water in the wet season in collaboration with Nepal and India. Improve soil structure, texture, humus and vegetation, the water holding capacity is increased such that the water is made available and release slowly during the dry months. Stream flow channel should be made smooth primarily by observing the law of nature. In case of need for better environment al purpose, manipulation may be made. Besides Himalayan action, we should go for country wide formal and informal education to our people down to grass-root relating to water management , appropriate afforestation over areas befitting on the principle of national land use planning and forestry practices should aim at achieving control of evapo-transpiration, loss of water and make available more water in the dry months.

Saline Water Influence on the Composition of Microflora at South West Coastal Region of Bangladesh

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The present study related some aquatic parameters and its microfloral distribution along the salinity gradients of south west coast of Bangladesh. There have been some significant relations found among water parameters and the bacterial populations. The *Pseudomonas* sp. population was found to be significantly correlated to the electrical conductivity (EC), total P and Cl⁻ of the water. Besides, the pH, EC, Ca⁺², NH⁺⁴ and total P and Cl⁻ of the water influencing the abundance of the *Vibrio* sp. population. This study therefore indicates that changes in coastal water quality could influence the bacterial flora of the coastal Bangladesh. This in turn shall influence the diseases outbreaks of the area and in broader senesces microbial composition of an area.

Energy and Economic Growth Nexus: Challenges for Emerging Economies

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The need for appropriate energy options is perhaps the most important challenge facing our nation and the world in the 21st century. The acuteness of the challenge results from the growth of energy supply and demand, security, and environmental concerns. The projected increase in energy use as well as increase in electricity demand implies a substantial increase in fossil fuel supplies or dramatic transformation of the fossil fuel-based energy infrastructure. Geological and geopolitical realities

regarding the availability of oil and, to some extent, natural gas underlie major energy security concerns. Fossil fuel combustions are increasingly at the center of decisions about how the global energy system evolves, one that carries on in the “business as usual” overwhelming dependence on fossil fuels or one that introduces technologies and policies that greatly improve efficiency.

Bangladesh needs new supplies of affordable, sustainable energy to power the fast growing economy of the country. As such, Bangladesh Government has prepared a Power Sector Master Plan in the year 2010, which has been updated last year. The Master Plan has set the target of generating 24,000 MW in 2021, 40,000 MW in 2031 and 60,000 MW in 2041. Therefore, huge potentials are there for the power sector to grow, which obviously is associated with lots of challenges. Some of the challenges are investment, human resource, technology adoption, power market, research and development, etc. The country is needed to provide a platform to attract experts worldwide, and help to create in-country expertise through scientific as well as entrepreneurial collaboration. That can be helpful for individual entrepreneurs to develop applicable technologies and systems for the development of the energy and power sector. The Government of Bangladesh is ready to provide the intellectual leadership to seek innovative solutions for efficient, cost-effective and environmentally sustainable development of Bangladesh’s energy and power infrastructure.

Opportunities and challenges in the power sector need to be identified through open discussion with relevant stakeholders to ensure sustainability. This requires short, medium and long-term planning to enhance power sector’s efficiency, productivity, reliability and sustainability. Innovation and introduction of efficient and effective technologies are one of the key areas for sustainable energy and power system. The Government encourages exchange of knowledge and information through joint-research, seminars, conferences and collaborations with relevant power sector agencies to receive targeted R&D training in specific areas of need.

Using Remote Sensing and GIS to Detect Green Space Dynamics in Dhaka City, Bangladesh

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This study illustrates the use of remote sensing and geographic information system (GIS) techniques to detect spatial and temporal dynamics of urban green space due to rapid expansion of urban in northern part of Dhaka city, Bangladesh. Both types of primary and secondary data used for mapping and monitoring the green spaces in the study area. Primary data was collected through intensive fieldwork including in depth interviews of the local dwellers, focus group discussion and observation to identify the causes of sinking green space. Multi-spectral Landsat TM and Google Earth imageries were used to monitoring the land cover dynamics. A geospatial technique in GIS used for analyzing and interpretation of the green space changes. The results reveal that the green spaces of northern part of Dhaka city has been changed drastically due to growth of urban fringe area and lack of proper management of green spaces conservation. This study is a synthesis of time series images that may provide reliable inputs for urban planners and natural scientists for effective planning and management of urbanization. As green spaces are the focal point for proper functioning of an urban ecosystem, hence it is imperative to take proper measures to conserve the optimum green space in the urban area for sustainable environment.

Sustainable Industrialization and Urbanization in Dhaka City: A Study Focusing on Sustainable Industrialization Problems at Mirpur Area in Dhaka City

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This paper provides a general understanding of Sustainable industrialization and urbanization in Dhaka city and tries to embrace related sustainability issues and challenges hindrance to sustainable urban development focusing on sustainable industrialization problems at Mirpur area in Dhaka city. Around 50 million Bangladeshis live in urban areas, and this number is set to rise to 83 million by 2030. There is considerable literature on the factors facilitating industrial modernization and enterprise development. The first country to industrialize was the United Kingdom during the Industrial Revolution, commencing in the eighteenth century. By the end of the 20th century, East Asia had become one of the most recently industrialized regions of the world. Industrialization is an essential pre-requisite for rapid and sustained economic development. It is the process in which a society or country transforms itself from a primarily agricultural society into an industrial society one based on the manufacturing of goods and services. Characteristics of industrialization include the use of technological innovation to solve problems as opposed to superstition or dependency upon conditions outside human control such as the weather, as well as more efficient division of labor and economic growth. The growth of economy, the internal development of a nation depends upon the development of industrial sector. The industrial sector in Bangladesh is a huge contributor for the country's economic growth. The Bangladesh economy is expanding with 5.0-6.0 percent annual growth during last one decade. Recent statistics show that contribution of agriculture to GDP is much lower at 20 percent than that of the

industry at 30 percent. The present government has envisioned that the contribution of industry to GDP will be increased to 40 percent by year 2021. So it is clear that the Bangladesh economy is being transformed from agriculture to industry-driven one. This study indicates the inadequacy of infrastructural services and basic amenities; environmental degradation; traffic jam and accidents; violence and socio-economic insecurity are the major challenges for Dhaka city which are created through rapid urbanization. One of the direct consequences of urbanization of Dhaka city is the increase in solid waste generation, placing a serious threat to the natural resources, and consequently holding back sustainable development. The paper finally concludes providing some strategies that might be helpful to the policy makers in formulating development policies for sustainable urban services.

Framework for Sustainable Development of the Haors

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The haors – large saucer-shaped depression characterized by freshwater wetland ecosystems – are unique landscapes in northeastern part of Bangladesh, spanning over 20,000 km² in seven districts, and are home to 20 million people. A total of 373 haors are second most ecologically important areas behind the Sunderbans. The wetlands in haors support about 975 species of animals and aves. The Hakaluki haor, Tanguar Haor, and Ratargul freshwater swamps provide habitat to numerous endangered, threatened, and vulnerable plants and animals. Abundant water resources, 40% of which is originated within the territory of Bangladesh, can serve as vital economic and ecological resources for the country. However, population growth, land-use changes, unplanned infrastructure building, degradation of physical

environment both within and outside of Bangladesh, and climate change are posing serious threat to the uniqueness of the haor ecosystems. The haors have been declared as ecologically critical area under the provision of Bangladesh Environmental Conservation Act of 1999.

The major challenges that need to be addressed in the haor region include flash flood, riverbank erosion, lack of educational institutions, water and sanitation, healthcare, sedimentation and drainage congestion, basin-scale integrated water resources management (IWRM) plan, and potential impact of climate change on water availability and crop yield.

The government of Bangladesh has developed a Haor Master Plan to protect, preserve, and restore ecosystems in the context of IWRM. Under the Master Plan, existing national policies (19), strategies (3), and plans (8) are examined to establish relevance to the Haor issues. Recently, the Haor Master Plan has been brought under Bangladesh Delta Plan 2100 (BDP2100). As a signatory to the UN's sustainable development goals (SDGs), it is imperative to align the objectives outlined in the Haor Master Plan and the BDP2100. This paper evaluates the Haor Master Plan in the context of SDGs and makes recommendations to make necessary changes that will allow the government of Bangladesh to implement the Master Plan, while meeting the targets of the relevant SDGs.

Bangladesh Delta Plan 2100: Is It Compatible with the SDGs?

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Bangladesh has made tangible progress in achieving most of the Millennium Development Goals (MDGs) as they pertain to

poverty reduction, primary education, gender parity, maternal health, and child mortality. Additionally, the economic growth of Bangladesh over the last few decades has been quite satisfactory with a GDP growth of over 6%. The per capita GDP has grown from \$631 in 1990 to \$1,276 in 2010. Recently, the World Bank has recognized Bangladesh as a lower-middle income country. However, the economic growth in the country has occurred at the cost of environmental degradation. The country has also failed to eradicate extreme poverty from several regions, including in the haor, river-islands, and parts of the Hill Tracts. The share of income between the top 0.1% and the bottom 50% of the population has widen over time, which is in conflict with the spirit of SDGs. This is particularly important as the country enters the new phases of development, namely the adaptation and implementation of the UN's agenda 2030, a.k.a, the SDGs, which revolve around the idea of economic growth for all while ensuring social inclusion and environmental viability.

Over 80% of the land area in Bangladesh belongs to Bengal delta. Due to low-lying elevations (15% of land below 1 m) and dense population (1,142/sq.km in 2011), Bangladesh is considered one of the most vulnerable countries in the world to the impact of climate change. In the face of population growth, continued environmental degradation, and climate change, it will be challenging to sustain the economic growth and to achieve the SDGs in coming decades. The pressure on limited resources in already high, which is likely to become worse in the coming decades.

It is imperative to formulate a long-term strategic plan to ensure the survival and growth of the delta and integrity of the environment. This is a monumental task to formulate a long-term plan for economic growth that will put the country on a right trajectory to achieve the middle income status, while safeguarding the environment and ensuring social inclusion. Recently, a large consortium, led by consultancy firm Twynstra Gudde, has signed a contract with the government of Bangladesh to formulate a long-term governance strategy called Bangladesh Delta Plan 2100

(BDP2100). As per the Inception Report for the BDP2100, “the mission is to develop strategies which contribute to disaster risk reduction, water safety and climate change resilience and adaptation, food security, and economic development of the country. The overall objective of Bangladesh Delta Plan 2100 is to realize a sustainable and commonly agreed-upon strategy, with all relevant stakeholders, for an optimum level of water safety and food security as well as sustained economic growth of Bangladesh and a framework for its implementation.” This paper assesses the various aspects of BDP2100 in the context of SDGs that are directly relevant to the economy, livelihood, and ecosystems of the Bengal delta (SDGs# 6, 13, 14, 15, and 17). This author holds the view that the BDP2100 lacks merits on several grounds to be compatible with desired principles of the SDGs. Recommendations are made to bring the proposed BDP2100 in line with the SDGs.

Harvesting of Flood Water for Sustainable Development for Food Security in Context of Global Warming and Climate Change

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Population growth and climate change are main factors for water crisis and food insecurity. Climate change is affecting the availability of water; it will affect the soil moisture conditions, rainfall patterns, and its intensity in time and space that will create extreme conditions of floods and droughts. Hence the development and management of flood affected areas is very essential for crops production and food security. Agricultural adjustment of crops in flood affected areas in flood period as follow land by zoning the flood- plain in flood- zones and development of storage of flood water as surface reservoirs as well as recharging the ground water by means of natural and artificial

methods of flood water for future irrigation. In this way we can enhance the crop production in flood-prone areas for food security. Flood water may be harvested in the following way;

- Raising the boundary of farm on all sides of field and planting trees, shrubs, herbs and grasses on the raised boundary of field in the flood plain for retention and detention of flood water in the field for recharging of ground water and siltation of field by sedimentation by reducing the velocity of flood water.
- Spreading the flood water in non-flood zone by making temporary diversions in the path of flood water for super saturation of soil and recharging the ground water in non-flood zone
- Remodelling and restructuring of old water bodies in the flood plain for collection of flood water and constructing and developing new ponds, tanks, lakes, wetlands etc. in flood plain and filling it with flood water for future irrigation.
- Artificial recharge of ground water by constructing a series of infiltration /injection well on both sides of river bank.
- Creation of farm ponds in each farm in about 10% area of farm for collecting the flood water in flood plain.
- Construction of small dams/reservoirs in each river/stream in the foot hills area of Himalaya.
- Construction of a series of weirs/ barrages in each river to store the flood water within the river bank for utilisation in non rainy season.
- Development of all water bodies within flood plain and storing flood water in all water bodies in non-flood plain by link drains from flood plain to non-flood plain. That is creation of soil dam with flood water and living with flood.

A Case Study on Occupational Health and Safety of Footwear Manufacturing Industry

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Bangladesh engaged with leather processing business since British period, and the first tannery of Bangladesh was established in 1940 by the famous entrepreneur Late Mr. RP Saha in Narayanganj (Billah, et al. 2000; Biswas and Rahman, 2013). Tanneries are one of the emerging sectors for trade and finance but it has adverse effect to the society, environment and worker (Azom.et at, 2012; Human Right Watch, 2012). According to ILO (2014) occupational hazard lies as the hazardous genesis of almost all fatalities in industrialized generation, over the 2.3 million fatalities that take place annually, over 2 million fatalities are caused by work related diseases. The main objective is to assess the status of occupational health and safety of a footwear manufacturing industry with respect to the Social Compliance. Apex Footwear Limited pioneered the export of value added finished products export in the leather sector of Bangladesh and is also involved in the local footwear retail business with the second largest shoe retail network in the country. Overall occupational health and safety management practice in Apex Footwear Limited was found good. Though some deficiency found during this short visit, but commitment of top management towards occupational health and safety was impressive. It can be noted that, compliance is a continuous improvement process. The beneficial impacts on the nation as well as human beings would only be meaningful and sustainable development would only be possible if the adverse effects are minimized through strict maintenance and control measures.

Dynamics of Water Development in the Upper Tista Basin: Apprehensions and Implications for Bangladesh

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Tista (Teesta) River often regarded as the lifeline of Darjeeling - Sikkim Himalaya is one of the major transboundary rivers flowing the Eastern Himalayan landscape. The river is the fourth major river after the Ganges, Brahmaputra and Meghna in the Eastern South Asian region. The basin overflowed by Tista and its tributaries has been home and source of livelihood to several social groups in Sikkim, northern West Bengal (India) and Bangladesh since historic past. However, the historic symbiotic and intimate human-environment relationship between people and natural resource bases in the Tista Basin has been increasingly put to danger by diverse undercurrents of development in recent times.

Besides other forms of development including expansion of agriculture and irrigation, construction of roads and buildings, unplanned urbanization etc, the Central and Provincial Governments of India are forcefully underway with series of hydropower dams in the upper catchment of the basin. There are concerns that building of Hydro-dams may lead to river-induced seismicity in this geologically young and tectonically active region besides several other environmental, socio-cultural and socio-economic fallouts because of their little scientific basis. Further, there have been serious issues on table with regard to sharing of Tista water between India and Bangladesh. Besides several existing and proposed hydro-dams in the Sikkim-Darjeeling Catchment, the Government of West Bengal has diverted almost entire Tista Water via artificial canals at Tista (Gajoldoba) Barrage in Jalpaiguri to irrigate its thirsty North Bengal leaving little or no water for Bangladesh.

Unscientific and unsustainable management of Tista water has resulted into various forms of conflicts across the basin right from Sikkim in India to the lower reaches in Bangladesh. Moreover, in the absence of reliable data and official agreement, technical issues regarding the quantity, division and share of the waters has become the bone of contention between India and Bangladesh.

This paper attempts to debate and discuss dynamics of unscientific water appropriation in the upper and middle catchments of the Tista Basin and argue upon critical issues of transboundary water management in the region.

Coping Strategies of Slum Settlement for Services and Facilities: Case Study of Korail Slum in Dhaka City

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Rural to urban migration is attributed to extreme rural poverty and landlessness and large urban rural wage differentials. The capacity of the urban centers in these circumstances to satisfy the basic civic needs of growth is heavily challenged, especially in the metropolis of Bangladesh. It is a concern on the one hand as Dhaka is faced with more and more management challenges in terms of providing public services, local public goods and amenities to this bulk of population yet again, it is an opportunity on the other, as the city provides different livelihood options for this set of migrants which has a scope for eventually giving rise to an improved living standard for this mass. Dhaka is one of the fastest growing mega cities in the world, therefore from the rural area mostly, a large number of new migrants (who are

predominantly poor) arrive at Dhaka on an annual basis. These people come to Dhaka with an aspiration to live a better life with different opportunities and better facilities, which has the likelihood to improve their living standards. This rising population tends to contribute to Dhaka's economic growth quite significantly in areas like the much-needed labor to manufacturing, services and in many other sectors. Therefore, Dhaka is likely to face tremendous challenges in expanding the boundary and intensifying the existing infrastructure and avoiding deterioration of living standards resulting from congestion, pollution and lack of basic services. These dire situations jointly resulted from delivery of inadequate service and worsening environmental conditions, disproportionately affect the poor, a substantial part of which are the dwellers of Dhaka's slums.

In this backdrop, this study mainly focuses on coping strategies of Korail Slum for various basic service and facility deliveries, in the context of continuous threat of eviction, which is located at Gulshan Thana in Dhaka city. This research will concentrate on the condition of various facilities and services now existed in the slum area of korail. This paper will shed light on Innovative techniques and strategies that have been devised by the slum dwellers, NGO's or CBO's and Government agencies for rendering various facilities and services towards slum people in a very compact settlement.

This research will use desk research, participant observation method and focus group discussion for collecting data related to various service and facility related issues like housing, community facilities, education and health facilities, recreation facilities, utility services like water and drainage, transport and accessibility, environment etc. It is expected that this research could show the coping mechanism of low income settlements in a developing country which could be an exemplary laboratory for urban innovations.

Development Destructing the Environment is not an Appreciable Option

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Development is an integrated concept. It encompasses human development, social development, economic development, cultural development, and of course the development of the environment. We need development but that shouldn't be in contradiction to SDG #9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Thanking to our entrepreneurial attitude and hard-working people, Bangladesh' economy is growing very fast at the rate of 7% annually. Already a lower-middle income country we have assigned us a goal to be a upper-middle income country within 5 years. Not only in economics Bangladesh is advancing fast socioeconomically too. Poverty, particularly extreme poverty is rapidly decreasing, 's people's well-being and lifestyles are improving, like increase of average life span, huge reduction in child mortality, full enrolment to primary, improvement in sanitation and so on. In many of these aspects Bangladesh is even ahead of its large neighbor, India.

However, these developments are coming at the cost of environment. A recent study shows that Bangladesh is losing its arable land at 1% annually, and this rate destruction, it is estimated that by 2050, no arable land will be left to feed around 200 million people then living in this country. Under such circumstance will it be possible to make Bangladesh a developed country as per the vision of our current national leadership?

The problems and gaps that we see in our present development strategy are as follows:

- 1) Ongoing infrastructure development is creating a huge number of IDPs (Internally Displaced People). Internal displacement may create a domino effect.

- 2) Huge hunger for land from civil and military establishments. Land is the most constrained resource in Bangladesh and thus needs to be used most cautiously.
- 3) No initiative is visible for developing renewable energy sources, other than limited exploration of solar energy. Wind energy option is totally being ignored. While, many countries have achieved 100% reliance on renewable energy. We are pathetically lagging in this aspect.

While, our government is focusing on infrastructure building using our constrained land resource and energy development through nuclear and fossil fuels, we need to focus on optimal and most beneficial use of land and getting energy through renewable sources.

Monitoring of Metal Pollution in Waterways Across Bangladesh and Ecological and Public Health Implications of Pollution

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Using innovative ‘artificial mussels (AM)’ technology for the first time, this study detected eight heavy metals(Cd, Cu, Fe, Mn, Ni,

Pb, U, Zn) on a regular basis in waterways across Bangladesh (Chittagong, Dhaka andKhulna). Three heavy metals, viz. Co, Cr and Hg were always below the instrumental detection levels in all the sites during the study period. Through this study, seven metal pollution “hot spots” have been identified, of which, five “hot spots” (Cu, Fe, Mn, Ni, Pb) were located in the Buriganga River, close to the capital Dhaka. Based on this study, the Buriganga River can be classified as the most polluted waterway in Bangladesh compared to waterways monitored in Khulna and Chittagong. Direct effluents discharged from tanneries, textiles are, most likely, reasons for elevated concentrations of heavy metals in the Buriganga River. In other areas (Khulna), agriculture and fish farming effluents may have caused higher

Cu, U and Zn in the Bhairab and Rupsa Rivers, whereas untreated industrial discharge and ship breaking activities can be linked to elevated Cd in the coastal sites (Chittagong). Metal pollution may cause significant impacts on water quality (irrigation, drinking), aquatic biodiversity (lethal and sub-lethal effects), food contamination/food security (bioaccumulation of metals in crops and seafood), human health (diseases) and livelihoods of people associated with wetlands.

উপকূলীয় পরিবেশে জলবায়ু পরিবর্তন ও প্রতিক্রিয়া

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বর্তমান বিশ্বের সর্বাধিক আলোচিত বিষয় হচ্ছে পরিবেশের ভারসাম্যহীনতা এবং জলবায়ু পরিবর্তন। গ্রীণহাউস গ্যাস ও কার্বন ডাই অক্সাইডের প্রভাবে ওজোন স্তরের তারতম্য, সমুদ্র পৃষ্ঠের উচ্চতা বৃদ্ধি, বৈশ্বিক উষ্ণতা, প্রাকৃতিক দুর্যোগসহ নানাবিধ বিপর্যয়ের মুখোমুখি পৃথিবী। জলবায়ু পরিবর্তনে মানুষের সৃষ্ট কারণসমূহ হলো—বনাঞ্চল ও জীববৈচিত্র্য ধ্বংস, জলাভূমির অবক্ষয়, শিল্পায়ন ও খনিজ জ্বালানি পোড়ানো, পাহাড় কাটা, নদীপথের স্বাভাবিক গতিরোধ, অবকাঠামো নির্মাণ, মাত্রাতিরিক্ত প্রাকৃতিক সম্পদ আহরণ, বনজসম্পদ ধ্বংস। বিশ্বের উষ্ণতা বৃদ্ধির

জন্য কার্বন নিঃসরণই ৮৪.৮১% দায়ী। কার্বন ডাই অক্সাইড তাছাড়াও বিংশ শতাব্দীর মধ্যভাগ থেকে গ্রিনহাউস গ্যাসের নিঃসরণ এবং বন ধ্বংসের কারণে পৃথিবীর বায়ুমণ্ডলের তাপমাত্রা বৃদ্ধি পেয়েছে। ভূমি ব্যবহারের পরিবর্তনে সৌরশক্তি শোষণ ও প্রতিফলনে পরিবর্তন আনে এবং তা জলবায়ু পরিবর্তনে সহায়তা করে। বায়ুমণ্ডলে গ্রিনহাউস গ্যাসের আবরণ পৃথিবীপৃষ্ঠ হতে বিকিরিত তাপ শোষণ করে ও পৃথিবী পৃষ্ঠের দিকে প্রতিফলিত করে এবং মহাশূন্যে চলে যেতে বাধা দেয়, ফলে ভূ-পৃষ্ঠের তাপমাত্রা ক্রমাগত বৃদ্ধি পাচ্ছে। জলবায়ু পরিবর্তনে প্রাকৃতিক কারণসমূহ হলো—সৌর শক্তির তারতম্য, পৃথিবীর ঘূর্ণন, অগ্নুৎপাত, সামুদ্রিক শ্রোতের তারতম্য। জাতিসংঘের আইপিসিসিসির তথ্যমতে, গত শতাব্দীতে পৃথিবীর গড় তাপমাত্রা ০.৭ ডিগ্রি সে. বৃদ্ধি পেয়েছে। ২০২০ সালে এ তাপমাত্রা আরও ০.৬৫ ডিগ্রি সে. বাড়বে। প্রতিবেদনটিতে দেখা যায়, ২০৩০ সাল নাগাদ বার্ষিক গড় বৃষ্টিপাত বাড়বে ৫ শতাংশ এবং ২১০০ সালে এ বৃদ্ধির হার গিয়ে দাঁড়াবে ১০ শতাংশে। গ্রীষ্মকালীন গড় তাপমাত্রা বৃদ্ধির তুলনায় শীতকালে গড় তাপমাত্রা বৃদ্ধির হার হবে বেশি। অন্যদিকে শীতের তীব্রতা অনেকটাই কমে যাবে এবং গরমের মাত্রা ক্রমশ বাড়বে। বিশেষজ্ঞদের গবেষণার ফলাফল অনুযায়ী জলবায়ু পরিবর্তনের ফলে প্রাথমিকভাবে যে সকল প্রভাব দেখা যাচ্ছে তার মধ্যে রয়েছে—বৈশ্বিক তাপমাত্রা বৃদ্ধি, অতিবৃষ্টি এবং ক্ষতিকর বন্যার প্রকোপ, খরার মেয়াদ বৃদ্ধি, সমুদ্রপৃষ্ঠের উচ্চতা বৃদ্ধি, লোনা পানির অনুপ্রবেশ এবং বাড়-জলোচ্ছ্বাসের প্রকোপ বৃদ্ধি। বিশ্বব্যাপী প্রাকৃতিক দুর্যোগ বৃদ্ধির ঘটনায়, এর ঝুঁকিতে থাকা দেশগুলোর তালিকায় বাংলাদেশের অবস্থায় শীর্ষে। দেশের প্রধান প্রাকৃতিক দুর্যোগের মধ্যে রয়েছে বন্যা, ঘূর্ণিঝড় (সাইক্লোন), জলোচ্ছ্বাস, খরা, ভূমিকম্প, সুনামি, পাহাড়ি ঢল, কাল বৈশাখী, টর্নেডো ও ভূমিধ্বস ইত্যাদি। জলবায়ু পরিবর্তনের কারণে উপকূলীয় এলাকায় প্রাকৃতিক দুর্যোগের তীব্রতা ও পুনঃপৌনিকতা এখন আরো বেড়ে গেছে। এদেশের ৭ কোটি লোক জলবায়ু পরিবর্তনের শিকার হবে বলে ধারণা করা হচ্ছে। এতে দেশের অন্যান্য অঞ্চলের তুলনায় উপকূলীয় অঞ্চলের লোকজন বেশি ক্ষতিগ্রস্ত হবে। এটা ধারণা করা হচ্ছে যে, ২০৫০ সালের মধ্যে সমুদ্রপৃষ্ঠের উচ্চতা ৪৫ সেন্টিমিটার বৃদ্ধি পাবে এবং এর ফলে বাংলাদেশের ১০-১৫% এলাকা পানির নিচে তলিয়ে যাবে। জলবায়ু পরিবর্তনের ফলে ২০৩০ সাল নাগাদ বাংলাদেশের গড় তাপমাত্রা বাড়বে ১ ডিগ্রি সেন্টিগ্রেড। বৈশ্বিক উষ্ণতা ও সমুদ্রপৃষ্ঠের উচ্চতা বৃদ্ধির জন্য দায়ী হচ্ছে প্রধানত জীবাশ্ম জ্বালানি এবং বনায়নের উল্লেখযোগ্য বিস্তার না হওয়া, যা অর্থনীতি ও পরিবেশের উপর মারাত্মকভাবে বিরূপ প্রভাব ফেলে।

A Study on Environmental Impact of Telecommunication Infrastructures in Bangladesh and Potential Remedies Towards Sustainable Development of Such Set-Up

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Telecommunication industry of Bangladesh is a rapidly moving sector. It is known that, mobile towers generate radio frequency which may have negative impact on environment and human health. The mobile towers are being established here and there, especially in city areas. City areas are congested with towers. But in this 21st century we cannot live without such an effective communication method. So it should be ensured that people can use this service with as less environmental impact as possible. This study focuses on the environmental impact of telecommunication infrastructures in Bangladesh and potential remedies towards sustainable development of such set-up. Telecom operators in Bangladesh need to consider such impact. They should follow the national and international guidelines (whatever available) in this regard, for example, Bangladesh National Frequency Allocation Plan (NFAP), ICNIRP ((The International Commission on Non-Ionizing Radiation Protection) Guidelines etc. Telecom sites must be installed in planned manner. Operators must ensure that new towers are installed properly following global best practices and guidelines. These are very crucial considering the impact of this sector in the economy of Bangladesh. This is also aligned with two of the SDGs i.e. Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation and Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable.

Bottleneck Analysis on Water and Sanitation in Chhattisgarh-Primary Survey Report

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India has the second largest number of people in the world, with the majority of them living in rural areas. Rural sanitation in India is one of humankind's greatest and gravest problems. In recent years the percentage of open defecation (OD) in the world to be found in India has risen from 55 to 60 per cent. The Sanitation Challenge Sanitation (often referred to as 'environmental sanitation') includes interventions for the safe management and disposal/re-use of waste. The delivery of safe sanitation services includes infrastructure (e.g. latrines, sewers), associated behaviors (e.g. toilet usage, hand-washing) and a requisite enabling environment (e.g. public health regulations, fiscal incentive schemes for achieving sanitation outcomes). Safe sanitation prevents waste from coming into contact with humans.

he failure of the TSC, with many more rural households and people doing Open Defecation at the end of the period than near its start, the much cited 60 million missing toilets, and the skewing of the limited benefits of the programme against the poor, all point to the enormity of the problem and the built in barriers to doing better. The Total Sanitation Campaign was modified as the Nirmal Bhaart Abhiyan in 2012 by the MDWS to accelerate the coverage of sanitation across the country through focus on Sanitation and Hygiene Advocacy and Communication Strategy (SHACS). In Chhattisgarh sanitation and drinking water supply are looked after by the Public Health and Engineering Department (PHED) with assistance from the Communication and Capacity Development Unit (CCDU). Being a newly created State in 2000,

Chhattisgarh launched Total Sanitation Campaign (TSC) in 2002-03 starting from 5 districts. Till date 817 panchayats out of 9795 Gram Panchayats have been awarded the Nirmal Gram Puraskar (NGP) after becoming free from open defecation. The number of household latrines has gone up from 892 in 2003-04 to 37179 in 2011 (as per the Ministry of Drinking Water and Sanitation, Government of India).

Although significant progress has been made in terms of individual household toilet coverage in the state which is 54%, it is alarming to note that about 85 percent people still go for open defecation (Swasth Panchayat Survey 2010, Department of Health and Census 2011). The data released by census 2011 shows that only 14.5% of rural households use a house hold latrine.

The study objective is to find out bottleneck analysis of water and sanitation programs in Chhattisgarh. The methodology to adopt the study was to conduct focused group discussion and key informant interviews for ascertaining the bottlenecks in community level WASH programs. To conduct key informant interviews with Government officials in the 3 districts of Dantewada, Sarguja and Rajnandgaon for understanding the bottlenecks. In each district fifty Gram panchayats sarpancha were surveyed through structured questionnaire. The study try to find out what are the bottlenecks and issues which create hindrance for ODF. The major findings are subsidy, frequent change in Government policy, Monitoring mechanism, and organization structure.

Evaluation of Microbial Quality of Hatirjheel in Dhaka City

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Microbiological health risks are major concerning issue in all over the world. Almost all the major water bodies (lake/khal) particularly in the urban or semi-urban area have been suffering severely pollutions. Therefore if we manage to safe our surface water in and around the city, we can reduce the demand of ground water for the city dwellers by the proper use or these lakes and ponds. This study was conducted to evaluate and find out seasonal variation of microbial quality of water of Hatirjheel in Dhaka City. The selected water samples were examined for the concentration of total viable bacteria, salmonella, shigella, E.coli, total fungi, Vibrio cholerae species in Hatirjheel, Dhaka city. The microbial analysis was performed to trace the presence of organisms and pathogens such as E.coli, salmonella, shigella, klebsiella and Vibrio spp. etc. According to the observation all of the organisms were higher in rainy season than winter season except Salmonella spp. The number of Total Viable Bacteria was 2.25×10^8 cfu/100 ml in rainy season and 7.4×10^5 cfu/100 ml in winter season. Total fungi found 9.36×10^5 cfu/100 ml in rainy season and 1.6×10^2 cfu/100 ml in winter season. E.coli was found 2.14×10^5 cfu/100 ml in rainy season and 0 in winter season. The number of Salmonella spp. was 0 in rainy season and 4.0×10^1 cfu/100 ml in winter season and Shigella spp. was 1.98×10^3 cfu/100 ml in rainy season and 0 in winter season. Vibrio spp. 1.92×10^5 and 1.2×10^2 cfu/100 ml was isolated respectively in rainy season and winter season. The findings of the study and the presented data is preferred that the water is not safe for human health and also indicate that this water is vulnerable for diarrhea, dysentery, typhoid fever, shigellosis, salmonellosis, parasitic worm infection,

hemolytic uremia syndrome, hepatitis and gastroenteritis. The microbial quality of the water was poor, suggesting contamination of the lake water by domestic and industrial wastes and other anthropogenic activities. So it is important to control the pollution for proper use of this water in various purposes.

Corruption: The Number one Barrier to the Way of Sustainable Development in Bangladesh

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Few years ago Bangladesh was well known to the world as the country of corruption. It was the number one corrupt country in the world for five consecutive years from 2001 to 2005. Although the situation has been improved thereafter, it's not at all satisfactory rather the improvement has been stagnant for quite sometimes. Given the direct relation of corruption to sustainability, if corruption increases sustainability decreases and conversely if corruption decreases sustainability increases, and hence without control of corruption sustainable development goals can never be attained. The main objective of this review study is to indicate how corruptions allow sustainability of nature and development. The data has been derived from different sources including the Transparency International (TI) and newspapers' reports. According to TI's corruption perception index (CPI) 2015 more than six billion people live in countries with a serious corruption problem; 68% of the total countries are with high-scale corruptions and even 50% of the G20 countries are among them. Lowest scored countries are North Korea, Somalia (167th), Afghanistan (166th), Sudan (165th), Angola and South Sudan (163th), and among the South Asian countries Bangladesh seems to be most corrupt country after Afghanistan as it ranked 139th while Nepal's position is 130th, Pakistan's 117th, Sri Lanka's 83th and India's 76th. Bangladesh's position is 25th

from the lowest since 2014. It indicates that its corruption is still rampant and there is no sign of improvement. Let us look into the costs of roads and highways in Bangladesh wherefrom we can guess the scale of corruption in other sectors. According to the global bank's research, low and middle income countries should spend around Tk. 17 crores per kilometre for a new four-lane highway, and Tk. 11 crores to upgrade a two-lane highway to four-lane. Complying with this estimation while India spends equivalent to around Tk. 9-10 crores for each kilometre of 4-lane highway and 5-6 crores for a kilometre of 2-way road, Bangladesh spends exorbitantly up to Tk. 118 crores in some cases of constructing 4-lane highway and Tk. 54 crores for upgrading 2-lane to 4-lane. In a report in 2014, unicef said European countries on an average spend Tk. 28 crores per kilometre for construction of 4-lane highway and Tk. 20 crores for 2-lane. At the same time, China's estimated cost for a kilometre of 4-lane highway is Tk. 12-13 crores and Tk. 10 crores for 2-lane. An irony of fate is despite the expenditure is 10-12 times higher than the lowest expenditure (India), the roads and highways in Bangladesh are too vulnerable and once or twice a year almost all roads and highways require repairing. Not only in roads and highways, flyovers and other mega structures also gobble up much more expenditures than requirement and the expenditures in every public sectors in Bangladesh is exorbitant and unreasonable. Same is the case in Dhaka city's roads and streets. Together with the foggy and black smokes of unfit vehicles and smoky atmosphere created by brick kilns, the shabby condition of roads and streets in Dhaka has made it the least liveable city in the world for the last three consecutive years. As production of construction materials requires huge quantities of elements and by-products of nature, the more expenditure for construction, the more pressure on the nature and most importantly is the waste of hard-earned money. If corruption is controlled, construction sustains there will be less pressure on nature and money can be properly utilised for people's well-being particularly for the climate vulnerable people.

Ensuring Sustainable Consumption and Production Pattern in Bangladesh

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Bangladesh has achieved sufficiency in food grain production in 2013 and maintaining with the production of 38.875 million tons in 2015-16 (Rahman, 2016). Now the country has the challenge of systematizing its consumption and production pattern. The chain of food crops produced, processed and marketed are not transparent to consumers, neither most of these pass the test results as safe. Several tests has revealed a major threat of food hazards including pesticide residues, chemical toxicities for preservation, adulterations during processing and preparations. Abandoned and unnecessary use of spray materials, fertilizing chemicals and taste increasing adulterants are so common making it difficult to choose any safe food items from any forms and types it is marketed. This is posing heavy taxation on public health and become the most vulnerable menace to healthy living in the developing and lower-mid income countries like Bangladesh.

Researchers, food departments and NGOs with some private initiatives have been in the process of developing and establishing safer production and consumption chain. These are done in isolated attempts. The sustainable technologies are meager. These are not user-friendly either. There was a hard need of an integrated effort to make the system working viably against existing chemical-dependent production- marketing system. There are, however, some traceable or possible to be traceable essential safe food products in the food chain like – brown and grey rice with part of edible bran, anti-virus free eggs, brown sugar and molasses, traditional pop rice from natural grown paddy, rice bran oil, natural honey, whole gain wheat atta of local varieties, naturally grown vegetable and fruits, natural fishes. These are, as yet, serving very minor part of the consumer.

A series of reasons and conditions are responsible for the non-existence of safe food chain in the country. The author has been working in several positions and capacity in the production and marketing of safe foods in Bangladesh for over a decade and half and in networking the relevant peoples and organizations. Presently he is engaged in an effort in implementing some SDGs in the first inaugurated Union in Bangladesh with SDG including sustainable tourism which creates jobs, promotes local culture and products.

This paper includes the statement of past experiences and future guideline in establishing and ensuring a sustainable consumption with adequate production pattern in Bangladesh. The paper also covers different areas under SDGs number 12.2, 12.3, 12.4, 12.5,12.8, 12.8.b,12.8.c namely, achieving sustainable management and efficient use of natural resources; reducing per capita food waste at the retail and consumer level, and reduce food losses along production and supply chains including post-harvest losses; achieve environmentally sound management of chemicals and all wastes throughout their life cycle in accordance with agreed international frameworks and significantly reduce their release to air, water and soil to minimize their adverse impacts on human health and the environment; substantially reduce waste generation through prevention, reduction, recycling, and reuse; ensure that people have the relevant information and awareness for sustainable development and lifestyles in harmony with nature; developing and implementing tools to monitor sustainable development impacts for sustainable tourism which creates jobs, promotes local culture and products.

Community Enterprise Approach to Address Sustainable Development Goals (SDGs): A Case Study of Bangladesh

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Bangladesh is in a deltaic plain of major river basin, most of its lands are floodplain. The low elevation make deltas vulnerable to sea-level rise and other climate change effect. Besides, Bangladesh is also experiencing sharp changes in rainfall patterns, droughts, late monsoons, recurring floods, and warm winters. These changes are already having major impacts on the economic performance of Bangladesh and on the life and livelihoods of millions of poor farming communities.

On the contrary, Floodplains are robust and renewable resources. Through proper management of the floodplains; these can remain extremely productive and diverse. Attempts have taken to protect Bangladesh's floodplain resources from mismanagement and to ensure their equitable use, but these may not be adequate to cope with pervasive, systematic or surprise change associated with climate change. Establishment of resilient community based organizations (CBOs) is centered to adapt and sustainable management of the resources by the community in emerging climate change effects.

While on the one hand, public sector of poor developing countries mired by various difficulties in their willingness and capacity to perform their roles in community development, on the other hand it is difficult for community itself to come up with various resources to initiate development momentum or break development bottleneck on their own. Additionally as a member of civil society the NGO can play an active role to promote and mobilize opinions in shaping government policies and also assist community groups to participate on their own to play such roles. In the case of SHISUK's Daudkandi model , the NGO not only helped utilizing an extremely under used local resource by

creating community ownership over its use and realizing consequent economic benefits, but also brought together people, created solidarity among them, instilled some degree of transparency and accountability in management, assisted in accessing mainstream non-microcredit facility; and all this subsequently resulted in many significant side benefits as can be observed address several Sustainable Development Goal (SDG) and industrial development in a locality . Such as Goal 3: Ensure healthy lives and promote well-being for all at community level; Goal 6: Sustainable management of water and sanitation; Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation; and Goal 13: Combating climate change;

The approach helps to establish self-esteem, mutual respect and togetherness within the society through facilitating more interaction and participation and to create a favorable environment for good governance. As a result the down-trodden, landless, rich and poor, local administration, community leaders, etc have the opportunity with equity in the participatory management process leading towards a sustainable socio-economic development. This keeps an augmented atmosphere for better social tie and integrity. By way of active involvement and practice and by teach-ins when required, the stakeholders became familiar with these concepts and workable apts. Ability to cope with natural disasters such as storms, floods and droughts and adapt to ongoing processes resulting from climate change (e.g. loss of biodiversity, reduced rainfall and increased drought) has enhanced through the project, at both the household and wider community level. It undertakes adaptation and mitigation challenges in changing environments/climate through collective risk sharing, reduction of production cost, promotion of better marketing mechanism and sustainable management of their own resources. The positive social impacts of the project as outlined in the previous sections has improved communities' abilities to respond collectively, whilst the economic gains the project brings has increased households' resilience in facing these events.

Implementing the Sustainable Development Goal (SDG) for Terrestrial Ecosystem of Bangladesh: a Synthesis

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The protection and restoration of terrestrial ecosystem of Bangladesh is unique challenge for a highly populated country of earth. The forest land is unique habitat for the diverse plants and animals of the country. The country's forest and greenery are always encountering anthropogenic pressure besides climatic changes. The extraction pressure is in many cases has no alternatives like fuel, household use and trade for the poor segment. The outcome is devastating as many villages are lack of large trees that shelter rare fauna like vultures and herpetofauna, etc.

The present paper reviews the current status of natural resources and policies of Bangladesh. It also provide the avenue to improve the area of interest to focus SDG 16, protection, restoration and promotion of sustainable use of terrestrial eco-systems to the readers and policy makers. In addition, other issues like conserving threatened plants and animals, preventing illegal activities within the natural boundaries, poaching and land grabbing, etc. will be discussed. Improving the social forestry practices, medicinal plants and private forest reserves practices for good environmental conservation practices will be focused. An acceptable governance process will be discussed for better bio-diversity protection.

Fish Pass: An Overview on Bangladesh Structure

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Fish Migration is a well known phenomenon occurring in many fish species for different purpose in their life cycle. Migration may occur for short distances in a river or can involve thousands of kilometers between freshwater and marine environment. Dams constructed on rivers and obstruct free flow of water upstream and downstream of impoundments thus impacting the natural recruitment of migrating fish stocks, their by depleting their stocks, which has serious socio economic fallout on riverine fisheries. In order to mitigate their negative impact the “Fish Passes” are constructed to facilitate movement of migratory fishes upstream and downstream to complete natural life cycle on one hand and maintain the ecological integrity of the river as well. The concept of fish pass in Bangladesh is very new, introduced in 1990. We have only two fish passes in Moulavi Bazar, Sylhet and Sariakandi, Bogra. This area needs intensive research effort to study migration including behaviour of the fishes and hydraulics of river to design effective fish passes.

সকলের জন্য সুস্বাস্থ্য নিশ্চিত করা;
(Ensure healthy lives and promote wellbeing for all
at all ages)

বিধান চন্দ্র পাল

যুগ্ম সম্পাদক,

বাংলাদেশ পরিবেশ আন্দোলন (বাপা)

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বিশ্ব-স্বাস্থ্য সংস্থা (WHO)-র তত্ত্বাবধানে Health for All বা 'সবার জন্য স্বাস্থ্য' নিশ্চিতকরণের লক্ষ্যে ১৯৭৮ সালে কাজাখিস্তানের আলমাতা শহরে সবার জন্য প্রাথমিক স্বাস্থ্যসেবা বা Primary healthcare (PHC) পরিকল্পনা ঘোষণা করা হয়। আলমাতা ঘোষণার মূল সুরই ছিল স্বাস্থ্যসেবাকে সর্বজনীন করে একটি সুন্দর পৃথিবী গড়ে তোলা। সেখানে প্রাথমিক স্বাস্থ্যসেবার লক্ষ্যমাত্রা ধরা হয়েছিলো ২০০০ সাল পর্যন্ত। কমিউনিটির সকলের প্রত্যক্ষ এবং পরোক্ষ সহযোগিতা, সকল সেক্টরের সমন্বয়, যথাযথ প্রযুক্তি ব্যবহার এবং ন্যায্যতার-ভিত্তিতে স্বাস্থ্যসেবা প্রদানের বিষয়টিও সেখানে উল্লেখিত হয়েছিল। এছাড়া মূলনীতিতে "essential healthcare" বা অতি-প্রয়োজনীয় স্বাস্থ্যসেবা নিশ্চিত করার বিষয়টিও গুরুত্ব পেয়েছিল। কিন্তু অত্যন্ত দুঃখের বিষয় যে, ২০০০ সাল নাগাদ চত্বরসমূহ ঐবধষঃষপধৎব এর সন্তোষজনক লক্ষ্য অর্জিত হয় নি। তাই ২০০০ সালে জাতিসংঘ মিলেনিয়াম ডেভেলপমেন্ট গোলস (Millennium Development Goals -MDGs) ঘোষণায়ও ৮টি লক্ষ্যমাত্রার মধ্যে শিশু, মাতৃস্বাস্থ্য ও রোগব্যাধির বিষয়টিকে বিশেষভাবে প্রাধান্য দেয়া হয়। লক্ষ্য অর্জনের সময় নির্ধারণ করা হয় ২০১৫ সাল পর্যন্ত। অনেক কাজের মধ্য দিয়ে ২০১৫ সাল পর্যন্ত সময়কাল অতিবাহিত হয়েছে। এমডিজি অর্জনে বাংলাদেশ বিশেষ সাফল্য অর্জন করেছে - যা বিশেষভাবে প্রশংসিত হয়েছে। স্বাস্থ্য খাতে বাংলাদেশের অগ্রগতি এই অঞ্চলের দেশগুলোর মধ্যে মডেল হিসেবে আন্তর্জাতিক মহলে স্বীকৃতি পেয়েছে। শুধু তাই নয়, স্বাস্থ্যের উন্নতিতে প্রযুক্তি ব্যবহার করে বাংলাদেশ পুরস্কৃত হয়েছে। তারপরও সকলের জন্য সুস্বাস্থ্য নিশ্চিত করার বিষয়টি সদূর পরাহত রয়ে গেছে। ফলে ২০১৬ থেকে ২০৩০ মেয়াদে এসডিজির যে ১৭টি লক্ষ্যমাত্রা নির্ধারণ করা হয়েছে তার মধ্যে গুরুত্ব সহকারে সকলের জন্য স্বাস্থ্যের বিষয়টি বিশেষভাবে প্রাধান্য পেয়েছে। সুতরাং এসডিজি'র পরিকল্পনা বাস্তবায়ন করতে হলে পেছনের সাফল্য যেমন পর্যালোচনা করতে হবে, তেমনি পেছনের অভিজ্ঞতাকেও কাজে লাগাতে হবে। এটা সচেতনভাবে খেয়াল রাখতে হবে যে, সকলের জন্য স্বাস্থ্য নিশ্চিতকরণের বিষয়টি অর্থনৈতিক মুক্তি, সুশাসন, পরিবেশ ইত্যাদি অনেককিছুর সাথেই ওতপ্রোতভাবে

জড়িত। এছাড়া দক্ষতার সাথে প্রযুক্তি ব্যবহারের মাধ্যমে স্বাস্থ্যক্ষেত্রে উন্নয়নের স্থিতিশীলতা বজায় রাখা গুরুত্বপূর্ণ।

Safe Water for Sustainable Development: How Difficult to Achieve in the Peri Urban Areas of Dhaka City

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On September 21, 2016, The Lancet published the first analysis showing which countries are progressing toward the SDGs, data indicate that Bangladesh ranked 151st in a list of 188 countries in the first-ever global survey of health parameters. The country has performed poorly in hygiene, access to safe water and urban air quality, the survey showed. Water, considered equivalent to life, is at the heart of a daily crisis faced by millions of the world's people – a crisis that breeds ill-health, destroys livelihoods and inflicts unnecessary human suffering. Overcoming the crisis in water is one of the great human challenges of the 21st century and would act as a catalyst for progress in public health, education and poverty reduction. Expectedly, a key item in the MDGs, now has been identified as essential to accelerate the achievement of the SDGs. There is wide and persistent inequalities, on the face of the growing wealth and development divide and competition for scarce resources. In the rich households of cities, people enjoy access to unlimited quantity of water per day (eg above 400 litres) delivered to their homes at low prices, while, the poor households in the slums, peri urban and rural areas have access to less than 10/20 liters of water per person required to meet basic human needs obtainable often after a long struggle. According to the Household Income and Expenditure Survey (HIES) by

Bangladesh Bureau of Statistics, in 2010, at the national level, 85.37% used tube well water, 10.62% used supply water and the rest 4.01% used other sources of water, such as, ponds/ rivers/canals/wells etc. Though Bangladesh receives annually about 7.5 meters of water, 5.5 meters from surface flow and 2 meters from rainfall and so an immense quantity of surface water flows through Bangladesh, its availability to all citizens especially during the critical months becomes very much limited for different uses. About 90% of the huge water volume is available during only four months (June to September) each year and remaining 10% is received during October to May. Due to fluctuation in availability and lack of control over surface water, about 79% of the irrigated area use groundwater. Rice and other crop production traditionally use surface water irrigation which presently facing problems with the shortage of water, switching to ground water with pumps. This conjunctive use of surface water and groundwater generates serious problems due to the complexity of the strategy that involves management of surface water and groundwater as one resource under diverse, utilization/demand and hydro-geological settings. Data collected from the peri urban areas of Dhaka indicated the use for planning of conjunctive utilisation and to develop approach in the governance of this important resource to maximise the potential benefits from such use, an important need for sustainable development. It has been concluded that such planned conjunctive use of groundwater and surface water can provide the potential to offer both economic and social benefits through significantly increased water use efficiency.

Solar as Viable Primary Energy: Hype or Panacea?

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On the heels of gaining towering success in hitting 4+ million Solar Home Systems in off-grid areas with meteoric speed, Bangladesh government has rightfully set its eyes on weaning the national grid next of ever more dependency on fossil fuel by opening up the unsolicited sector to Renewables – especially solar. The goal is to generate 10% of electricity from Renewables – about 2,400 MW by 2021. To its credit, the government indeed has ‘walked the walk’ and the ‘Who’s Who’s of the world have jumped in the fray. Unfortunately however, despite three plus years of hard work by everyone involved, the dream remains, as of yet, largely unfulfilled.

The author spent 44 months collaborating with the government and won a 200 MW ac solar power plant award in late 2015. About 1,500 MW of additional solar capacity is also in the award pipeline. In contrast, the situation in wind and biomass does not seem that bright yet.

However, this presenter would love to argue that all hope is not lost yet. In hindsight, the long gestation period was rather to be expected. What we collectively deemed as unsatisfactory progress was nothing but the pre-ramp up of an S-curve, typical of any trailblazing endeavor. Even if half of what has so far been contemplated materializes, the country can be proud of its achievements.

In this paper, the author would like to touch upon the real challenges facing the nascent industry today and suggest potential mitigations thereof. High cost, low availability, small land holding and extremely stringent land acquisition regulation, intermittency, grid stability, energy storage, transmission line ‘Right of Way’, low irradiance, no upfront capital subsidy, high interest rates, solar EPC inexperience and a keen desire of all stakeholders to rapidly

bring down the tariff are issues that need to be addressed. Last but not the least, rooftop PPA/FIT will also be touched upon.

The author believes that a sound policy framework incorporating streamlined and predictable approval process addressing reality based tariff roadmap would go a long way in harnessing the country's true solar potential. It is his belief that the country can generate 30%+ of its electrical energy needs from solar alone by 2030 without endangering food security at all with the right kind of policy support in place. One way to do that would be to innovate solutions for solar to coexist with selective crop varieties without impacting yield very little for either.

Renewable Energy Pathway to Affordable, Reliable, Sustainable and Modern Energy in Bangladesh- Achieving SDG Goal 7

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Globally, Renewables now are established as mainstream sources of energy. Renewables will mainly substitute coal by 2030 to become the largest source of primary energy. The United Nations (UN) General Assembly adopted 17 Sustainable Development Goals (SDGs) containing, a dedicated goal on sustainable energy for all. The G7 countries also committed to strive “for a transformation of the energy sectors by 2050” and to “accelerate access to renewable energy in developing countries. The ‘global movement for 100% renewables’ calls for 100% renewable energy or 80% reductions in greenhouse gas emissions by 2050. In this connection, Renewable Energy path to 2030 is proposed for Bangladesh. The pathways are to generate Power through renewable sources, such as solar, wind, small hydro, Biomass etc. To evaluate the path, the indicators those have been considered

are: Energy consumption per capita, energy consumption per Growth Domestic Product (GDP) and the reduction amount of energy consumption. “Primary energy consumption per GDP” has been considered as an important parameter to build the RE path to SDG. The country’s per GDP annual energy consumption has been found to be 238 kgoe(excluding biomass1) in 2012. It is estimated that the primary energy consumption (excluding transportation and biomass) will increase approximately three-fold from 27,500ktoe in 2015 to 71,600ktoe in 2030. Bangladesh has set a target to have 3,168 MW of renewable energy capacity installed by 2021. 5% share of RE in electricity generation by the end 2015 and10% by 2021.100% renewable first-time electricity for 6 million households by 2017 and100% electricity access to rural areas by 2021.The country is focusing on solar and wind technology, addition of 1,740 MW of solar power by 2021, addition of 1,370 MW of wind energy capacity by 2021, The remaining balance (58 MW) to be made up of biomass-based power generation technologies (47 MW); biogas (7 MW) and mini-hydro power projects (4 MW). About 1,055 MW will be added through state-owned companies. The remaining 2113 MW will be installed by private sector companies. Appropriate, efficient and environment friendly use of renewable energy are to be promoted local technology in the field of renewable energy are to be promoted. Finally, coal burning should be stopped for power generation.

Indigenous Knowledge vs. Adopted Knowledge

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Bangladesh is facing a flood of “Development”. Government, different NGOs and donor/international organizations are working on different “development” issues like “poverty eradication”,

“communication” and “climate change” etc. In doing so, an important issue that is often overlooked, is respect for and inclusion of the basic indigenous knowledge of the people of Bangladesh in this development policies. After the introduction of the Western knowledge frame by the rulers, the indigenous knowledge of the people here is being neglected alleging it as “superstition”. Yet, the people of Bangladesh have survived and prospered for millennia using such knowledge. At the same time, the adopted western knowledge is proving to be inefficient - even harmful for the nature of this land. This paper discusses about the importance of indigenous knowledge to maintain sustainable living in this land and its importance as the method to deter climate change threats.

Climate Change Adaptation to Agriculture, Forestry and Its Mitigation Measures

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Bangladesh is a country of scenic beauty, and it has dynamic geophysical location, changing climatic pattern and edaphic land mass for these reasons the country has wide varieties of flora and faunal bio-diversities. But considering changed climate the assemblage of bio-diversity is under massive stress from natural as well as anthropogenic (human induced) activities simultaneously. The entire eco-system of this land are depleting and challenging the resources maximization. In these circumstances in order to ensure conservation of bio-diversity, the government of Bangladesh has declared 12 ECAs as an acronym of ecologically critical area till 2012 mostly located inland and in the coastal wetlands areas. Mainly ECA is an environmental protection zone where ecosystem is considered to be threatened to attain a critical state. ECAs are highly important in terms of their values of their resources and their ecological significance. All

components of environment including plants, fauna, soil, and water and air temperature directly affected by human induced activities are strongly prohibited in the ECAs. In spite of prohibition a number of human induced activities have been identified in ECA areas lately that directly or indirectly damage the quality of floral and faunal diversity.

What are the parameters of climate change? Climate change refers to any significant change in measures of climate such as temperature, precipitation or speedy wind lasting for an extended period (i.e. one decade or 10 year). Climate change is any long-term significant change in the average weather that given region experience.

The term climate change is often used interchangeably with the greenhouse effect or the term global warming. Global warming is an average increase in the temperature of the atmosphere near the earth surface and in the troposphere which can contribute to changes in global climate patterns. Global warming concentration of greenhouse gases will change the planet climate.

Greenhouse gases are very necessary to life because they keep the planet surface warmer than otherwise would be. But as the concentrations of these gases continue to increases in the atmosphere is rising over past levels. Gases that trap heat in the atmosphere are often called greenhouse gases (i.e. Carbon dioxide Co₂) Methane (CH₄), Nitrous Oxide (N₂O) and fluorinated gases (e.g. CFCs, HCFS and Halogens)

This research paper is directly focused on environmental issues of the following Topics of the conference: Goal 6: Sustainable management of water and sanitation; Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable; and Goal 14: Conservation and sustainable use of oceans, seas, and marine resources;

Evaluating Dhaka Circular Waterway and its Impact on Surrounding Urban Fabric

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Dhaka is surrounded by a system of rivers Buriganga, Turg, Balu and Shitalakhya which were traditionally used as water ways. These could be re-established as a circular waterway (2) for Dhaka. This circular waterway would be able to take off the traffic that unnecessarily cross through the city, thus ease up much of the traffic load. Dhaka was once crisscrossed by a system of canals connecting to the surrounding rivers (3). This system of water bodies served as channels of traffic and transportation besides other uses. People and goods are loaded and unloaded in the Ghats of river Buriganga have to be transported through the city to its destination in the remote area of the city. A couple of years back an attempt was made to introduce circular waterway in Dhaka but it failed (1, 4&5). In spite of the fact that water transport was a popular mode of traffic and transportation and urbanization in this region actually took off from Ghats, which gave Dhaka a hydraulic character.

However to make it sustainable, the proposed circular waterway will need to be hooked up and integrated with the rest of the city's traffic and transportation system. The study would be exploring the introduction of circular waterway and its integration with rest of the city morphology. The study focuses on resultant interface or Ghat morphology vis-à-vis city morphology.

Sustainable Urban Landscape Planning: A Search for Possibilities Around the Periphery of Dhaka City

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Sustainable urban landscape is such thought, where Responsible implementation of technology, materials and methods over urban context with minimal or no intervention of so called 'human desire to design'. Rather with the innovative vision of the relationship between nature and human being. The motto considers various aspects like water and soil conservation, storm water recycling, materials of vernacular practice, plant health and pest management along with socio-economic and environmental issues. Burning question is, the t; ranked 11th largest in the world with the growth rate of 3.2% and witnessed recurrent morphological transformation through different periods, how many opportunity it can provide us? Some hope yet exists, as Dhaka has tributaries of five river surroundings its periphery, much like the artilleries of the human body; recognized as the last adoption for survival of this capital. The objective of the research lies in micro level initiatives to acquire an 'Eco-fabric' over large-scale and zonal context of urban complexity. Some decision model with implementation of new ideas and technologies are presented where the term 'resilience' is preferred to adjust sustainable sites initiatives. Obviously, thermos's operandi of robustness had been chosen instead of Tabula-Rasa. The role of an architect for this research much more defined as 'landscape ecologist' from the concern of spatial pattern, scale and urban dynamics.

Impact of Parks and Playgrounds on Health of City Dwellers: A Case Study in Dhaka South City Corporation

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In Dhaka megacity, the opportunities of city dwellers in exercise, sports and recreation are decreasing due to the diminishing of open space, park and playground. At present, there are severe shortage of playground, park and open space in Dhaka. Following these, a lot of children have to stay at home because of the deficiency of adequate space for leisure and sports. As a result, the physical and mental growth of children has been disturbed. On the other hand, due to such decrease of open space, park and playground in Dhaka, it has a profound impact on the health of the city resident. For such situation, researchers and non-government organization like Green Voice Bangladesh are anxious and they make several short and long movements for this fundamental right of people of Dhaka city. As a consequence, it is now a prime concern for Dhaka city or more specifically for the Dhaka South City Corporation (DSCC) to evaluate the advantage and disadvantage of park and playground and its potential effect on human health.

According the UNITED NATION for Sustainable Development Goal (SDG), in the objectives number 11 and target number 7, it has been stated that “By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities”. Therefore, it is very crucial to conduct in-depth research in this area of research. To attain such goals, firstly, we have to list all the available open space, park and paly ground and identify their pros and cons. Secondly, to identify the portion of open space and total

urban population. Thirdly, to evaluate the health impact due to shortage of open space. Finally, to make some general recommendation for sustainable management and use of Public Park, open space and playground for city dwellers.

Impacts of Climate Change on Water Quality in Selected Coastal Areas of Bangladesh

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The aim of this study is to identify the impacts of climate change on water quality in the coastal area of Kalapara Upazila in Patuakhali district, Bangladesh. The earth's climate is changing due to population growth and other humans activities. Climate change may have significant impacts on the water resource. The water quality in the coastal region will be affected by various climatic factors including temperature, humidity, and precipitation. The 4th assessment report of the Intergovernmental Panel on Climate Change (IPCC) has considered the impacts of climate change on surface water quality. The study has collected climatic data such as temperature, humidity, rainfall of a metrological station in Kalapara, Patuakhali district in the year from 1975 to 2015 from the Bangladesh Meteorological Department (BMD). The study also collected water samples from the open sea, channels, rivers, ponds and tubewells. Some major physicochemical parameters of the water samples, i.e., pH, DO, EC, Na, K, Mg, Ca, Zn, Cu, Mn, Pd, Cd, As, Cl, SO₄, NO₃, PO₄, HCO₃, SO₄) were analyzed. The water samples analysis results were compared with those published reports on water quality in the coastal areas and interpreted accordingly. The metrological data analysis results illustrate that an average of 0.50C temperature has increased over the last 40 years and the projected average temperature will increase about 10C by the year 2050.

Reports show that the increase in average temperature of the area will lead to increase the amount of humidity and rainfall and thus, the climate change will have significant impacts on water quality. The water samples analysis results illustrated that most of the water samples including groundwater contained higher values of Na and Cl ions indicating saline water intrusion occurred in shallow aquifer of the study area. Thus, the groundwater of the areas is unsuitable for drinking, irrigation or domestic purposes threaten the ecosystem in the coastal areas of Bangladesh. Further studies on the issue are to be needed for the sustainability of water resource and the environment as well.

Climate Change and its Impact on South Asia and the Indian Ocean Countries

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The paper will look at past fifty years data on global climate change to show how it has impacted riparian countries like Bangladesh, India, and Pakistan. These late developing countries have in a sense been victims of the developed countries unsustainable lifestyle of conspicuous consumption based on fossil fuels such as coal, oil, natural gas, uranium, plutonium, etc. The paper will then expand its focus by turning the scope backward to the Industrial Revolution in Europe and its spillover in North America during the late eighteenth and nineteenth centuries. As the consumption of fossil fuel exceeded the limits of its exploitation after World War II, climate change became an urgent issue. With global temperatures rising and carbon content in the atmosphere increasing to dangerous proportions, the security of less developed and developing countries became a serious issue. Extremities of droughts and floods in the region of

South Asia may have been a more recent phenomenon. But its roots lay in the British imperial exploitation of South Asia's natural resources until the mid-twentieth century. The adoption of western model of development thru rapid industrialization based on energy created by fossil fuel mining and exploitation has only aggravated the already degraded condition of the environment. Nevertheless, worst victims of the western model of globalization had been countries like Bangladesh and Pakistan, whose contribution to atmospheric carbon emission is the lowest in the world. Hence, the study of the impact of climate change on the Indian Ocean rim countries like Bangladesh and Pakistan acquires greater and greater significance.

Impact of Environment on Health and its Importance to the Achievement of SDG-3

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MDG ended on 2015, with successful outcome in developing countries. Following MDG, SDG has started both in Developed and Developing countries. The objectives of SDG is to held the benefit of MDG for the well being of human civilization. Environmental instruments are very vital for the purpose. Outmost emphasis must be focused to protect environment free from pollution and misuse. Environment is essential for human civilization, wild animal and birds, forests, agriculture crops, water resource and above all air. Basically physical environment are air, water, sunlight, Temperature, beneficial microorganisms etc. Air flows throughout the world. If Air is polluted & it is carrying bacteria, virus, fungus, harmful particles disease dust, fumes, living and non living allergic substances which are mostly have the capacity and ability to produce diseases, such as influenza, tuberculosis, cancer etc. If water is polluted it spreads cholera, typhoid, amoebiasis viral hepatitis. If temperature comes

down to less than 10 degree cs. Virus grow causing infantile diarrhoea, pneumonia, Asthma, Allergic Rhinitis, Bronchiolities and bronchitis etc.

Fresh air is the outmost important for health. Though Bangladesh have rural and urban town but due to economic development, physical development urbanization spreading rapidly along with industrialization. At present, population of Bangladesh is 160 millions. Of which population of Dhaka is millions. At Dhaka particulate matter PM in air is 58% by road dust and soil dust, 18% by vehicle emission gases and 10% by garbage and 600 due to gases such as carbon dioxide, carbon monoxide, sulfur dioxide, lead and mercury, Unfortunately yet there is no good environmental programme for sustainable SDG-3. EPI running successfully to protect mother and children under 1 year age in Bangladesh. Vaccination is about 90% which is free of cost. Mothers are very much interested to immunize their son. I hope this 2 days session we will be able to formulate policies and action plan on SDG environmental issues.

Conservation of Seagrasses in St. Martin Island, Teknaf, Bangladesh

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The Coast line of Bangladesh extended about 710 km around the head of the Bay of Bengal from Teknaf in the south-east to Khulna in the south-west (Zafar, 1992). The investigated area of St Martin's Island is situated in between 92 18 E-92 21 E and 20 34 N-20 38 N and about 12 kilometer South from Southern most part of the main land of Bangladesh. The whole shelf area of Bangladesh i.e. up to 200 m depth contour is about 70,000 km² (Islam, 1970). Saint Martin Island is the only coral island in Bangladesh which is very attractive for tourists home and abroad.

The shores of the island are sandy- rocky beach. It is situated at the south-west of the Naff river estuary, the western side of the Myanmar Peninsula and the south-eastern side of Bangladesh main land. It is about 12km south from Teknaf sea beach. In worldwide there were only 60spp of seagrasses recorded in where were 5 spp found in Bangladesh coast. The seagrasses were such like resource which could serve coastal poor people to change their livelihood higher to higher. Seagrasses were not only a marine flowering plant but also an ornament organism. It was important to protect water and sediment pollutants, and coastal erosion. Seagrasses are potential sources of fodder and fertilizer. Seagrasses were the main food of the dugong, turtles and other marine animals and provide necessary surface for attachment, growth and development of many epiphytic seaweeds and small organisms which are important food for many marine animals. Seagrasses were also important for nursery ground of fishes. Such type of marine plant was important to reduce global warming and climatic effects.

Physico-chemical Condition of Wetland Environment in Northeastern Bangladesh: A Study on Shanir Haor, Sunamganj

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Haor is a saucer shaped depression formed by the interaction between terrestrial and aquatic system. It is flooded every year by monsoon floods from April/May until October and considered as most productive resource of Bangladesh. This study attempted to investigate the present Physico-chemical condition of Shanir Haor from July 2016 to December 2016. Shanir haor is a Meghalaya hill foot wetland located in Tahirpur upazilla of Sunamganj district in

northeastern Bangladesh which is bounded by Kynshi river in the north, Rakti river in the north-east to east, Nandia gang in the south and by the Baulai river in the west. Soil and water sample were collected from the study area through Borehole method and Composite sampling method which were later analyzed by using Sieve and Titration method respectively. Automated devices were used to measure water PH and turbidity. The water analysis indicate that, the average value of PH, DO, BOD₅, COD, Alkalinity, Turbidity, TS, TDS and TSS are 6.784, 9.326 mg/l, 0.884 mg/l, 44.84 mg/l, 9.92 ppm, 5.744 NTU, 70.116 mg/l, 22.384 mg/l and 47.73 mg/l respectively, which are in a positive progression than the standard value for surface water quality. According to the present study, the top soil of this haor is enriched with organic matter. Particle size analysis shows that, the average percentage of Gravels, Very Coarse Sand, Coarse Sand, Fine Sand, Very Fine Sand and the mixture of Silt and Clay are 2.25%, 17.5%, 26.75%, 10.25%, 30.75% and 8.75% respectively which represents a continuous siltation process due to flash flood. The result reveals that, this haor is favorable for flood water retention, agricultural production, fisheries, water quality maintenance, wildlife habitat and soil erosion control. This study is the first attempt to investigate the Physico-chemical condition into Haor areas of Bangladesh and also the first research on Shanir Haor. Despite of having few limitations it is hope that it will help the researchers for further study through intellectual opportunities and can ensure a sustainable environment for the wetlands of Bangladesh.

Physiochemical Properties and Pollution Status of the Water Column and Bottom Sediment in the North Western Shelf Zone of the Bay of Bengal”: A Study of Mg and Mn concentration

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Bangladesh is a developing nation with limited land based resources and a large population mostly young generation with acute unemployment problem. The delimitation of the Bay of Bengal has opened up a new frontier for its expedition and exploration. Government has been pushing forward blue economy concept for exploitation of ocean based resources including Gas and oil and other minerals. But lack of proper knowledge and capacity building, this initiative will not be successful. The present study focused on the physiochemical properties and pollution status of water column and bottom sediments i.e. heavy metal concentration especially Magnesium (Mg) and Manganese (Mn) in sea water and bottom sediment in the North Western Shelf Zone (NWSZ) of the Bay of Bengal. Study based on the primary data. For this purpose 4 nos water samples at different water depth and 1 no sediment sample at 75 metres depth have been collected from two locations and analyzed in the laboratory. The result shows that the average Mn concentration in the ocean water and sediment are 0.154 mg/L and 19.6 mg/L respectively. On the other hand Mg concentration in the ocean water is beyond the detectable range of

the equipment but in the sediment it was only 106.6 mg/L which was less than the world average 1289 mg/L. Appropriate control and regulatory measures are suggested to prevent further contamination of sea water and sediment by the heavy metal concentrations.

Oil Exploration and Indigenous People in North East India

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In April, 2009, the Ministry of Petroleum & Natural Gas (P&NG), Government of India emphasized that New Exploration Licensing Policy (NELP) has provided a major impetus to exploration efforts in the country. NELP was conceptualised by the Government during 1997–98 to provide an equal platform to both Public and Private sector companies in exploration and production of hydrocarbons with the Directorate General of Hydrocarbons as a nodal agency for its implementation. The Production Sharing Contract for Manipur Oil Block I was signed on June 30, 2010 and the Petroleum Exploration License was granted by the Manipur Government on September 23, 2010. The Contract for Manipur Block II was signed on July 19, 2010 and the license was granted by the Manipur Government on September 20, 2010. The deeds for the exploration licenses were signed on November 15, 2010. Oil and Natural Gas Commission of India estimates that Manipur has nearly 5000 billion cubic feet of oil. The Jubilant Energy is envisaged to drill oil from 30 oil wells, identified by the Alpha Geo Company based in Hyderabad, which has been conducting seismic studies for the Jubilant Energy.

However, the exploration and drilling of oil by Jubilant Energy in Manipur is marked by protest and resistance from the local population and civil society bodies. First of all, as envisaged and endorsed in the International Labour Organization Convention, the United Nations Declaration on Rights of the Indigenous People (UNDRIP) and others, free, fair and prior informed consent

of the people in the region, before taking up any trade agreement related to land, mountain, forest, water, minerals, hydrocarbons, etc., which are traditionally owned by the indigenous people was not taken into account before signing of the contract. The secretive nature of the process itself explains that the initiatives may not be people friendly at all. No one knows the amount of money invested, the period of exploration and drilling and further plans of refinery and so on. So far, important documents such as Detail Project Report, environmental clearance, the terms and conditions of all contracts and MoUs signed between the Government of India, Government of Manipur and Jubilant Oil and Gas are not made public. They are like well-guarded classified documents. Further, the oil venture carries the potential of militarization to the already militarised state in the name of protecting the national interest which will result in human rights violations. This has been the experiences of militarization for the last many decades.

Behind this background, the paper attempts to explore the issue raised by the Indigenous peoples, as endorsed by the United Nations Declaration on Rights of the Indigenous People, in the context of oil exploration in North East India.

Sustainable Used of Forest Products in Manipur, India A case of Fuelwood used in Brickfields

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The economy of Manipur, a small state situated in the north eastern part of India, is growing rapidly and the needs of its population has increased and diversified. Manipur in recent times

has seen economic transformation in the form of urbanization which has increased the demand for a number of household consumer goods. Growing income of an increasing population has increased the wood demand significantly. Manipur is one of the major users of wood in the North East region. The state had, till recently, the privilege of having fairly abundant quantity of wood from its land as 90 pc of land are under hill region. With 78 percent of its geographical area under forests, Manipur is richly endowed with forest resources. Utilization of these forest and wood resources for different purposes is, by and large, based on practical experience rather than scientifically developed product development and application technologies. Traditionally forest product in the form of firewood has been primary source of energy for most of the rural and hill people and limited demand from few units of brickfields. But in recent times with growing construction boom, demand for brick has significantly increased which has ultimately resulted in bulk consumption of fuelwood in brickfields. Fuelwood is still the major source of energy for brickfield as other input like coal is not available locally and transport cost is also very high. Brick industry is one of the oldest industries of the state which is thriving and sustaining due to favourable input and demand atmosphere of the state. In Manipur, there are numbers of industry which was established as early as 1890s in the modern era. It was in 1989 that the Brick Extrusion Machine was first introduced in Manipur and from that onwards a number of brick industries started growing up. In the last decade or so, there has been an increased in the scale of production and as well as new units emerged owing to the evolving economy of the state. There are more than 70 brick industries in the state. In the past few years, the growth of brick industry has been more on Imphal East and West where maximum government infrastructure development programme and urbanization led housing are taking place. The numbers of brick fields in the region is more than 30 units. There are two types of brick industry: traditional and semi-mechanized and in both of them, fuelwood is an important input. As development process goes on expanding, there are direct impacts on the forest area and environment. And used of fuelwood which is locally obtained also contributes to the direct degradation

of forest area as its demand is increasing at an exponential rate and scope of regeneration is limited. Though the increase in demand for bricks is an indication of people getting richer and in broader sense development is taking place, but the end result is on the forest area which is already affected by other factors. Increased demand of bricks adds accumulative negative implications on forest area as it caters the demand for fuelwood. The present paper seeks to estimate the amount and type of fuelwood used and its impact on environment. Further the paper will also look in the viability of the traditional practice of coppicing; whether they are sustaining or exhausted due to incremental demand. The paper is based on the information collected from the brickfields of Imphal East and Imphal West district, two major districts which have the major and maximum brickfields.

Water Crisis and Remedial Measures –A Case Study of Jharkhand State, India

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Water is a Precious natural resource, a basic human need and Prime national asset. . The major portion of Jharkhand state stands on hard rocks which lack primary porosity. The water bearing capacity of these rocks depend on their ability to develop secondary porosity which depend on the nature and extent of geological, structural and tectonic processes. Consequently a high degree of variations are seen even within a particular rock type. This is why the hydraulic properties of hard rocks are very complex.

Rapid industrialization, Urbanization & population growth have increased the demand of water in all spheres.. The water table is falling at the rate of 0.4m/year, forcing people to bore deeper and deeper. The recharge of aquifers is negligible as compared to extraction of water. Due to loss of Topsoil of cropland, the food security is at risk.. Soil erosion is a common phenomenon resulting in decrease in agricultural production. The total available surface water and ground water is approximately 30000 MCM , but actually one third of water is being utilized in industrial, Agricultural and domestic sectors. This summer in 2016 , there was acute scarcity of drinking water in the whole of Jharkhand due to low rainfall . Therefore the water resource management is essential in the state of Jharkhand state India.

The paper is mainly confined to outline the Geology, Geohydrology, aquifer characteristics, quality of water etc & suggest water resource management and remedial measures of water scarcity in the state of Jharkhand, India.

Making Cities and Human Settlements Inclusive, Safe, Resilient and Sustainable: A New Vision of the Cities of Bangladesh

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Cities currently account for approximately 80% of GDP generated worldwide. But while urbanization is rapidly moving with the global economy forward, rising inequality and exclusion within cities can derail benefit of development. Thus an inclusive city is a city in which the processes of development include a wide variety of citizens and activities. These cities maintain their wealth and creative power by avoiding marginalization. An inclusive city

is one that values all people and their needs equally. It is one in which all residents including the most marginalized of poor workers have a representative voice in governance, planning, and budgeting processes, and have access to sustainable livelihoods, legal housing and affordable basic services. Safe City is a technology driven concept, enabling inter agency collaboration, effective communication and better use of intelligence. A Resilient City is one that has developed capacities to help absorb future shocks and stresses to its social, economic, and technical systems and infrastructures so as to still be able to maintain essentially the same functions, structures, systems, and identity. A sustainable city is a city which is designed with consideration of environmental impact.

Urbanization and human settlement in Bangladesh is based on the riverine colonial administration. Formation and structure of urban centers in Bangladesh evolves from the administrative needs in unplanned way. Reform policy should be adopted to make them inclusive, safe, resilient and sustainable. This study is based on the holistic policies of plan preparation, development and development control mechanism of the cities of Bangladesh. The study will focus on the megacity Dhaka and its surrounding City corporations, pourashavas and small urban centres. The study will reveal new vision for the cities of Bangladesh to make them inclusive, safe, resilient and sustainable.

Present-day School Environment of Dhaka City: Perspective Out-door Games

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The Goal-11 of SDG focuses our attention to the fact that the inhabitants of a city should have the opportunity to have inclusive, safe, resilient and sustainable environment for better living. No

doubt that this goal has several aspects to address and we have to go a long way to achieve this goal; but in this paper I shall keep myself confined to one aspect only: school environment of Dhaka city. I would like to mention further that my focus has been still narrower; i.e. school's physical environment, especially open space environment. Philosophers of the world hold that young children must have congenial environment in order to have proper development, both physical and mental. Educational institutions must play a vital role here and open space is a pre-requisite in this respect. An Endeavour has been taken to put forward the rationale behind this contention. After a survey it was found that except few government schools, maximum school of Dhaka city do not have play grounds. Few recommendations have been made to overcome this problematic situation, including that the school authority should be compelled to make arrangements for the play grounds.

Spatio-temporal Variation of Groundwater Level in Rice Growing Seasons in Bangladesh

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Bangladesh is blessed with plenty of water resources by dint of its location in the major part of the delta of the Ganges-Brahmaputra-Meghna (GBM) river system. The underlying unconsolidated near surface fluvial and estuarine sediments form prolific aquifers and groundwater is drawn predominantly from these strata. Groundwater is used extensively for drinking and irrigation purpose here. Rice dominated agricultural pattern of this country require larger share of water for irrigation. Since the advent of high yield varieties of rice, the irrigation requirement has shown a manifold increase and at present about 80% of the total irrigation demand is fulfilled by using groundwater. In this context, it is of utmost importance to

explore the ground water scenario across the country to ensure the availability of groundwater resources in coming decades. This study aims at exploring the changing scenario of groundwater level within the six hydrological regions of the country in terms of two major rice growing seasons- Aus-Aman and Boro growing seasons. To accomplish the study, data on groundwater level have been collected from Bangladesh water development Board (BWDB) and irrigation water usage data have been collected from (Bangladesh Bureau of statistics). The changing pattern of groundwater level has been presented in maps using Inverse Distance Weighted (IDW) interpolation method in ArcGIS 10.3. The irrigation water usage data show that the dependency on groundwater for irrigation purpose is more protuberant in the northern and south-eastern parts of the country. The analyzed data also reveal that, the groundwater level is declining at a higher rate in northern parts of the country than the southern parts. Such lowering of groundwater level requires more energy to uptake water for irrigation which ultimately increases the input cost of production. Besides, the increasing demands of groundwater for drinking purpose along with irrigation usage may pose threat to the groundwater resource of the country. Thus, apposite measures and groundwater usage policy are required to ensure sustainable use of groundwater resources without hampering the growth of rice production in Bangladesh.

Markets as Social Spaces: Overviewing the Potentials of Community Market Areas in Dhaka as ‘New Social Spaces’

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Dhaka, the metropolitan city of 16 million people, is left with very limited open space for community participation, resulting from

the city's high land demand and soaring price ranges. The vision of an engaging public environment comes to reality when adequate public spaces are developed for people's interaction from all areas and backgrounds. One possible option for Dhaka city is to re-organize the community markets (bazaar in local terms), owned and maintained by Dhaka City Corporation (DCC) as better community places for all. These market areas are already established as the community hub for shopping of daily necessities, which have ample open spaces inside or around, and also, the vacant large roof areas. In most cases, these open spaces remain unused or under-used by illegal hawkers, and they carry the potentials to be used as small-scale public gathering places that host leisure activities, like- food courts, and playspace for children, seating arena, indoor game area etc. The paper analyzes the possibilities for the existing DCC markets around the city of becoming successful community public spaces for Dhaka, and follows several steps. Firstly, the study starts to analyze questioner survey results that portray Dhaka people's usage of public space during leisure times, and also attempts to find out the reasons behind infrequent use of the few existing open public spaces in Dhaka. Secondly, the paper reviews theoretical constructs of 'public space for all', while looking into case studies and urban standards of policies and design guidelines that synthesize 'community space' matrices. Thirdly, the paper studies the potentials of the existing market areas, and analyze two market spaces as case studies- in terms of their zoning, daily community participation, available spaces and uses, structural condition etc. Finally, upon obtaining guidance from the previous studies, the paper formulates a suggestion of policies and design guidelines for the successful transformation of the community market's open areas- as community spaces for better social interaction.

Development, Environmental Protection and Displacement in Northeast India

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Debates over displacement of indigenous people as a result of development projects or drives undertaken for conservation and environmental protection are age-old. Recent-most phenomena we observe are the denial or taking away of indigenous people's rights of ownership over resources without any prior and informed consent. Nation states in tacit collaboration with multi (or trans) national corporations are the prime movers, an activity, which structural adjustment programme (sic. Liberalization, privatization and globalization) have legitimized. The outcome is not only the indigenous are robbed of their property and wealth but also render them homeless and displaced. And often, rehabilitation programmes come only after cycles of protests and struggles, and indeed when the programmes are implemented the deserving do not get the rightful or rather lost in the politics of compensation. The paper argues that such logic of capitalism and overt practices are not only against the norms of social justice but also contradictory to principle of social policy as reflected in the Indian Constitution, which stands for providing enabling measures for those (sic. indigenous people or adhivasis) who are "unable" on account of historical, political or acquired social disability. In other words, as demanded by political and economic expediency, we witness as contradictory unfolding of the making and unmaking of social policy in India. This paper is based on the observed experiences of the phumdee (floating biomass) dwellers at Loktak Lake in Manipur. This shall help in understanding the issues of development, environmental protection and displacement within the larger debate of globalization in the Northeastern part of India.

Role of Social Capital for Climate Induced Disaster Management in Bangladesh

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Bangladesh is one of the most vulnerable countries of the world as far as the natural hazards and disasters are concerned. Every year different types of hazards and disasters occur in the country. It is expected that the natural disasters will be more prominent through climate change. In future the climate-induced disasters will add more catastrophes in the scenario. From now on, we have to prepare for the forthcoming disasters and prepare ourselves to mitigate it. Traditionally, British colonial top-down approach in disaster management was prominent in disaster risk reduction strategy of Bangladesh, which is, however, after the Hygo framework in 2005 was evolved to bottom-up community driven approach. But still the power of individuals and groups and the values produced among them (e.g., social capital) as an agent to disaster management has been overlooked in the national strategy. Several countries around the world have been practicing social capital as a tool of disaster management and there is a growing relationship between social capital and disasters. Social capital includes social networks and the norms of reciprocity and dependability, which are important to speed up disaster preparedness and recovery. An individual's preparedness is reciprocally determined through the amount of available material and intellectual resources, their social support networks, the community-level preparedness and the ability of the community to access resources from those in power. Thus disaster preparedness and response activities create new types of social capital.

It has been observed that individuals and the community as a whole require disaster-specific resources to prepare for, respond to, and recover from a particular disaster. Examples of climate induced disaster-specific resources of a local community could include knowledge about the flood/cyclone zones while constructing houses, timely forecasting to plan for evacuation or take shelter to a safer place, identification of evacuation routes and temporary shelters during the onset of extreme environmental events, a strategy to deal with children, the disabled and the elderly population during the response or recovery period. Social network could provide access to these resources and help individuals and the community to bounce back from climate induced disasters (Meyer, 2013). In this research work, the term “social capital” is defined as a composition of two components – a durable social network and resources (or values) in that network (Bourdieu, 1985). Thus, “social network” is defined here as the ties between the actors. An actor could be a person or an organization, and the relationships between the actors are ties. These nodes and ties link up to construct a network-like composition. The structure of the society is exactly this network-like structure (Scott, 1991; Wasserman & Faust, 1994; Zhao, 2013). The relationships and interaction among the actors produce some sorts of values or resources for the society. Thus activities and structure of social norms based on these ties are all important types of invisible capital, which brings benefit to the individuals and to the society as a whole while facing uncertainties (Portes, 1998; Leonardi, Nanetti, & Putnam, 2001). Based on the field experience, a conceptual diagram has been developed to exhibit the structure of the social networking of the study area in the coast of Bangladesh (Anwara Upazila, Chittagong). The local Union Disaster Management Committee (UDMC) plays a central role in building the social network for the study area. Except volunteer services and NGOs’ relief efforts during the emergency disaster response period, the local UDMC keeps strong ties with all of the agents that interact with it. Thus, the research paper aims to investigate and explore the role of social values at micro level by the community people while facing those events.

Building confidence and resilience of people to mitigate disasters needs the role of social capital to face and withstand these. The process of social capital would help to rebuild both the infrastructure, confident and ties within the communities. For example, Tokyo, following the 1923 earthquake, Kobe after the 1995 earthquake, and Tamil Nadu after 2002 Indian Ocean Tsunami, finds that those with good and effective social networks were better to coordinate recovery after effects of these disasters. Quick dissemination of information, financial and physical coordination minimizes the suffering of people through presence of social capital. Social capital helps to reduce after shocks of a disaster.

Impact of Waste Battery on Surface Water

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The production of Electrical and Electronic Equipment (EEE) is one of the fastest growing global manufacturing activities to easy and promote the lifestyle of human. The most using electronic device is computers, televisions, stereos, cell phones, electronic appliances and toys etc. Battery is the main source of power supply of most electronic device. Different types of battery is used in the world among them lithium ion battery, alkaline battery and lead acid battery are widely used in Bangladesh. Battery becomes waste by overcharging (melting, voltage depression, burning and burst) and over the life time. The waste battery is disposed in different way either proper or improper system all over the world. In our country the most possible disposal scenario is observed in

open places (low land, road side, river bank, in drain with or without solid waste) or by burning. This open dumping scenario may cause risk for environment (soil, water, air) and human health. The authors try to find out the impact of waste battery on surface water because surface water is directly act on irrigation, house hold works such as bathing, washing etc. and also effect on aquatic life. This study focuses the parameters arsenic (As), Lead (pb), Dissolved Oxygen (DO), Electric conductivity (EC) and pH in surface water due to waste battery.

Different types of battery immersed in water separately at different dosages. Then the above parameters were measured seven days interval till three months. From the result it is observed that, there is no arsenic within first four week for all types of batteries but from fifth to tenth week arsenic was found at the range of 0.48 mg/l to 18.95 mg/l. Lead is not leached in water till first four week for lithium ion and alkaline battery except lead acid battery. On the other hand lead is obtained from first week in lead acid solution. The overall amount of lead is obtained 0.12mg/l to 0.79 mg/l. All the value of As, pb were exceeded limit of World Health Organization (WHO), Environment Protection Authority (EPA) and Bangladesh standard. So polluted water by waste battery is toxic on human health, aquatic life and irrigation purposes. The value of pH is obtained for different battery in the range of 0.67 to 11.38, EC is obtained in the range of 93.08 μ S/cm to 12.49 MS/cm and DO is 1.18 mg/l to 9.74 mg/l. Some value of these parameters is in standard limit and some are out of standard for first to ten weeks. Finally it can be concluded that, the disposal of waste battery is one of the reason for pollution of surface water with respect to time.

Hard Realities of Development Sustainable Development Goals

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The MDGs (2000-2015) with eight goals, were found to be unachievable and resulted in definition of SDGs (2015-2030) with 17 goals. Both MDGs and SDGs are predicated on achieving the goals by economic growth, social development and environmental protection.

Achieving economic growth consists of economics dictating politics so that the GDP can be made to increase at a targeted rate. This necessarily involves increasing consumption of all kinds, and particularly fuel (oil) which is essential for agricultural produce, manufacture of consumer goods and other hardware, and providing services of all sorts. Economic growth also involves the unsustainable exploitation of natural resources, in turn involving environmental degradation and social upheavals. Further, oil is vital for transporting the food and goods and providing services (and oil itself!) whether by land, sea or air.

As GDP rises, the fuel demand and consumption rise, accompanied by increase in the gaseous, liquid and solid wastes which degrade the environment and affect huge sections of populations, especially the poor, and are resulting in planetary scale global warming leading to sea level rise and climate change.

Thus there is fundamental incompatibility between economic growth, social development and environmental protection, since the first always militates against the latter two. Since economic growth, social development and environmental protection, are the stated three instruments of achieving the goals of SDGs (and MDGs before it), the SDGs cannot be achieved unless the

fundamental policy conflict between the three instrumentalities is resolved.

The focus of the Conference on Bangladesh is important because Bangladesh is a densely populated country with most of its territory just above sea level, making it eminently vulnerable to sea level rise. Rising sea level is already evident in the Sunderbans region in India, and possibly also in portions of Bangladesh.

Unless nations of the world, especially those which contribute to GW by their enormous carbon (consumption) footprint, get off the neoliberal juggernaut of economic growth, SDGs will remain illusory and encourage dangerous complacency. This conference is a suitable venue to place hard and inconvenient facts before blind neoliberal policy.

Impact of a Green Area on Microclimate in the Street Level of Residential Area in Dhaka

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Dhaka has been accommodating its excessive population in both planned and unplanned residential areas. This accommodation tends to fill up the vegetation areas and acute the urban heat island effect in the city. Vegetation as a design element can improve urban microclimate and outdoor thermal comfort in urban spaces in hot climates. This paper tries to investigate how vegetation ground coverage affects the pedestrian thermal comfort in the street level of Dhaka city. Two types of residential areas were selected for the study. One of these types has vegetation areas mainly around a green field and the other has smaller vegetation areas scattered in that area. The streets of these areas can be classified in the aspect of having vegetation shading or not. Three dimensional microclimate model of both type of areas were

simulated in ENVImet®. Experimental methodology was used in this study. The simulation result has showed the impact of ground vegetation areas affects pedestrian comfort in the street level of Dhaka residential areas.

Relation between Population Density Pattern and Human Settlement Issues in Dhaka City

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Human settlement is a core subject of city planning and design. City planning, development and sustainability of city development; all are inter-related with human settlement. Actually there are enormous angle of human settlement study. But in this study, there will be an attempt to look insight the facts of population density patterns affecting the human settlement safety and security. Drawing an interplaying relationship between density pattern and human settlement safety, sustainability issues; concurrent in Dhaka city; is the core objective of the study.

The output of the studies would be-

- The pictorial output of Dhaka city population density, based on population census of 2001 and 2011.
- Difference of the human settlement issues in different densely populated areas in Dhaka city.

The study objective would be very much concise and would be relative with sustainable development. Any human settlement development issues are directly inter-related with population study. So the study interrelating population density and human settlement issues is one of the studies, necessity for all stakeholders.