

# Impact of Processed Wireless Sensor Networks on Biodiversity Conservation

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**Abstract** An explorative field observation to determine the impact of wireless sensor networks on biodiversity conservation at national parks in Bangladesh that was conducted in plants, animals and landscape. Everyone is using advanced wireless sensor networks, but no one is fully aware of its impact on conserving biodiversity. Plausible wireless sensor device has given people mobility, while also embracing wildlife's mental disorders associated with risks in their living places. That is why some strive for success, while others are frustrated by abuse of wireless sensor technology towards biodiversity. Biodiversity is an important instrument to sustain life. Everyone uses its benefit globally but none can conserve it in an effective manner at national parks. Yet environmental conservation experts have been facing the unexpected losses of biodiversity in every sphere as a very important global issue for several years. Biodiversity experts are looking for the right way to restore biodiversity for present and upcoming generations. The study aims to identify the root causes of losing biodiversity at Lawachara National Park in Moulvibazar district to stare as a study in regional issues. Quantitative and qualitative related park conservation data were collected from laboratory experiment, field observation, while secondary data were obtained from miscellaneous sources. The study highlights the impact of sensor networks with ISNA (Impact of Sensor Networks towards Animals) experiment on wildlife to be compared to feline body mass indices in a light and dark environment. The study illustrated the excess weight wildlife is about to die within 5-12 minutes due to processed tracking and digital poisoning in light environments due to active open eyes and staying at a fixed GPS location. The study also shows frequent sickness within 12-25 minutes for the underweight wildlife in the same environment, facilitating design and use of modular tags. The research replicates the risk of visitor's access to national parks with smartphone and high frequency sensor devices. These findings reflect the importance of conserving biodiversity at national parks that the State provides. A dynamic national park area wireless network control unit and adaptable solution has been anticipated with a restricted peripheral network system for biodiversity protection.

**Keywords** Biodiversity, National Park, Wireless Sensor, Policy, Secure Technology

## 1. Introduction

Biodiversity conservation generally develops strategies connecting the supportive assortment of environmental policy instruments. These conservation instruments interlink

with six principal goals of the strategy including (i) National Park Biodiversity Conservation, (ii) Sustainable use of ecosystem services, (iii) Reducing environmental pollution, (iv) Access benefits sharing of genetic resources, (v) Digital conservation with Biodiversity Clearing House Mechanism, and (vi) Raising social awareness for biodiversity conservation as one of the top priorities to society.

Different instruments are sometimes combined into a

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policy mix to address a specific environmental problem for biodiversity conservation. These biodiversity loss causes and environmental problems are usually caused by over-exploitation of natural resources, misuse of technology, services and systematic product consumption patterns [1]. Rapid loss of biodiversity remains one of the foremost conservation issues as it potentially disturbs ecosystem functions [2,3,4,5]. Damage is one of the most thought-provoking global environmental concerns [6], which has emerged as a dominating problem worldwide for several years on the coasts of various planets [7]. Everyone exploits biodiversity but none can conserve it in the absence of dynamic policies, institutional support, stakeholder engagement and ecotourism services, invasive alien species control measures and application of conservation technologies [8,9,10,11,12,13,14,15,16,17]. Thus, appropriate and specific policies are needed to prevent rapid loss of biodiversity. National Parks (NPs) are often targeted at lands where there is the least political resistance to their establishment and thus generally face anthropogenic threats. Due to the lack of accurate assessment, the development of indicators and indicators can lead to an understanding of updated rules and regulations related to biodiversity, which allow changes and trends to be monitored and adapted over time [18]. To date, no up-to-date comprehensive model incorporating various relevant

political, environmental, socio-cultural, technical, economic, institutional and legal processes [18] for national park biodiversity management has been developed.

The study highlights how to stimulate sustainable use of ecosystems to incorporate many of these elements, including stakeholder engagement, institutional participation, updated policy integration, and conservation technologies. This study explains biodiversity conservation for LNP management with the tools needed to study changes in conservation systems and their implications to provide rational policy and advanced wireless sensor technology options. To date, no comprehensive model has been developed for national park management to conserve biodiversity in developing countries that incorporates various relevant environmental, economic, technological, institutional, personal and social processes. Research aims to improve biodiversity policy options and technology applications.

## 2. Materials and Methods

### 2.1. Study Tools

The study site is situated in the civil administrative units of Kamalganj sub-district, Moulvibazar district under Forest Administration Unit, Bangladesh [19]. The study followed the materials and methods from the URLs [a-i]:

- a. URL: <http://article.sapub.org/10.5923.j.geo.20211101.02.html> (Loss of wetland biodiversity and Technology)
- b. URL: <http://article.sapub.org/10.5923.j.env.20211102.01.html> (Climate Crisis and Technology)
- c. URL: <http://article.sapub.org/10.5923.j.ijymb.20211001.03.html> (Numbness and Technology).
- d. URL: <https://ir.unimas.my/id/eprint/24535/> (Biodiversity conservation and Policy Instrument)
- e. URL: <http://article.sapub.org/10.5923.j.re.20221203.01.html> (Man-made Technological Heatwave)
- f. URL: <https://ccsenet.org/journal/index.php/gjhs/article/view/0/46717> (Environmental disease and Technology)
- g. URL: <https://www.ccsenet.org/journal/index.php/jsd/article/view/0/40313> (Psychological conservation)
- h. URL: <https://www.un-pub.eu/ojs/index.php/wjer/article/view/5855> (Policy on Environmental disease)
- i. URL: <https://ccsenet.org/journal/index.php/jpl/article/view/0/47787> (Society and Environmental disease)

The study showed the site map at Lawachara National Park's biodiversity, which as shown in Figure 1.

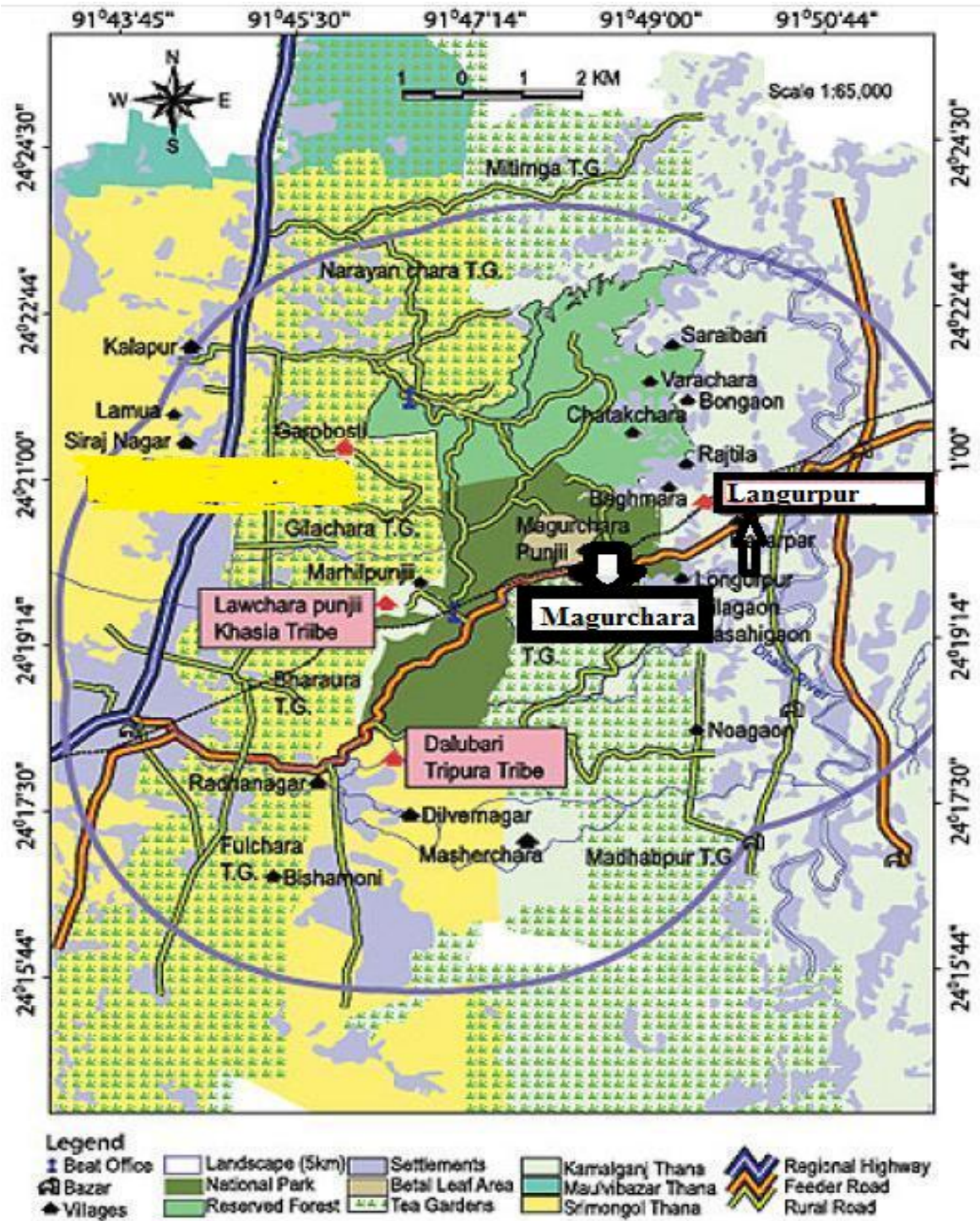


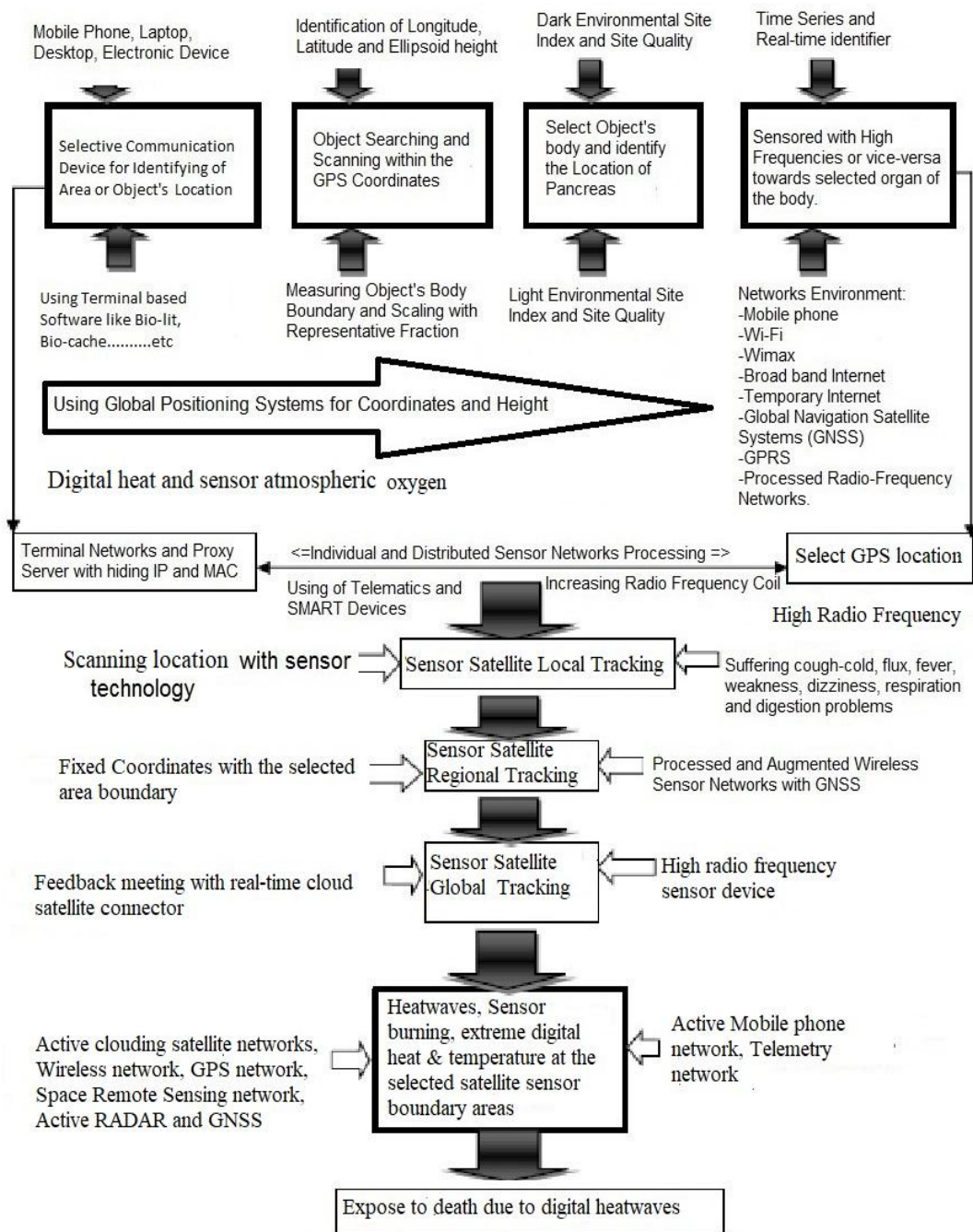
Figure 1. Lawachara National Park at Kamalaganj in Moulvibazar, Bangladesh [20,21]

Sensor Tracking towards the tree, dog and cat species at different specific GPS location including longitude, latitude and ellipsoid height in different steps, which as shown in Figure 2.

## 2.2. Procedure on Technological Loss of Biodiversity

All quantitative and qualitative related biodiversity data are collected and compiled according to the research objectives. These compiled data are also checked for accuracy from various sources to prepare master sheets for analysis and interpretation using updated software like MS Office 2021, R ver. 3.6 and SPSS ver.29.





**Figure 2.** Process of Man-made Technological loss of biodiversity [15]

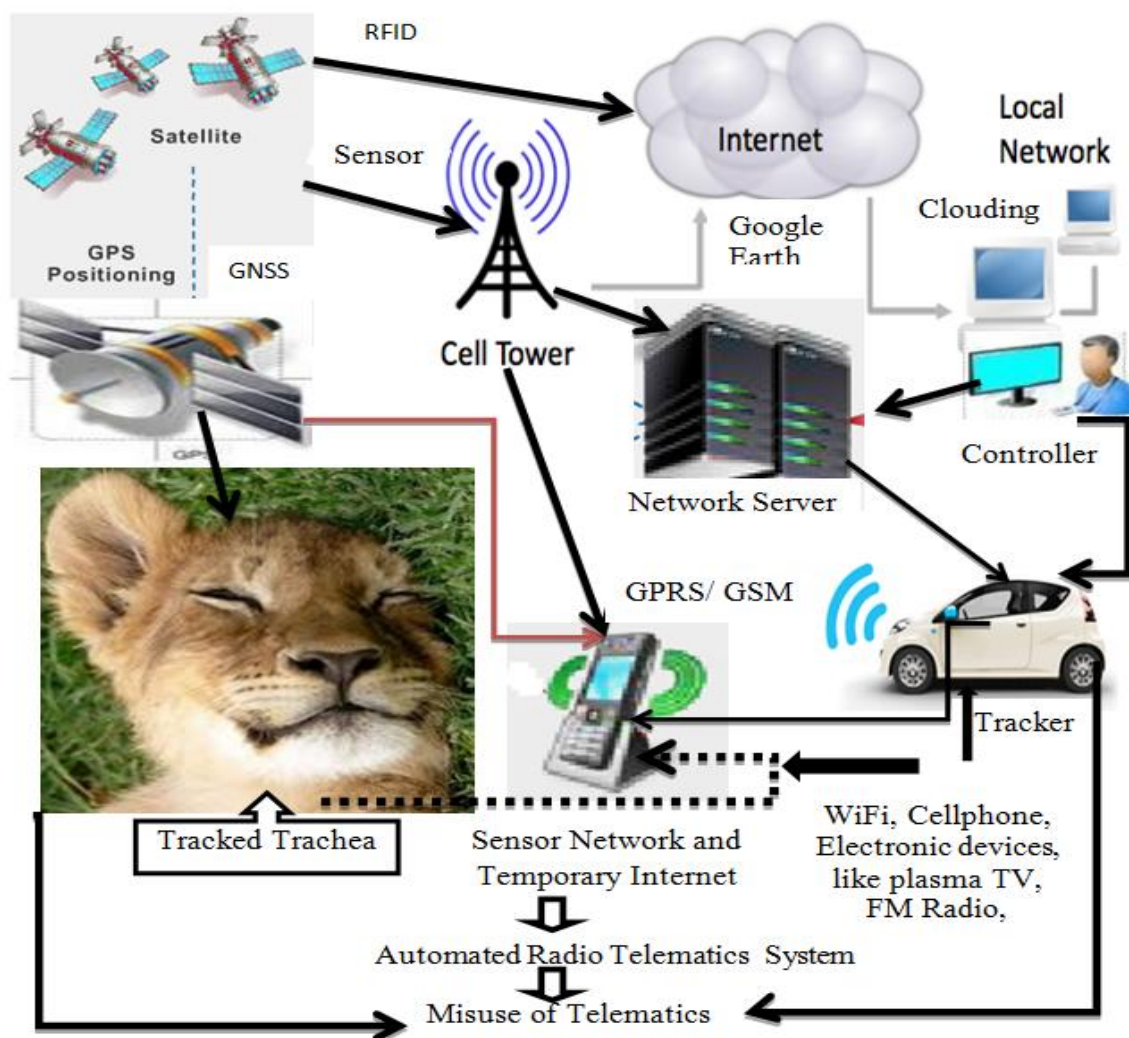
### 3. Results

From the study of misuse of wireless sensor device, it observed that the examined species- cat and dog were felt sleepy and after few moments, they could not breath properly, as a whole, they were about to die. Immediately cell phone removed and disconnected from the study area. During medication time, the study also observed that both animals felt pain at their throats separately. The study identified that the animals were suffered from cough-cold and fluctuated body temperature. The telematics device also affects on

tracking effective time to animals, which as shown in Table 1.

**Table 1.** Tracking effective time to animals

Type of animals	Environment		Impact
	Light	Dark	
Less weighted	More time (25 minutes)	Less time (15 minutes)	Sleepy and weakness
Heavy weighted	Average (12 minutes)	Less time (7 minutes)	About to die



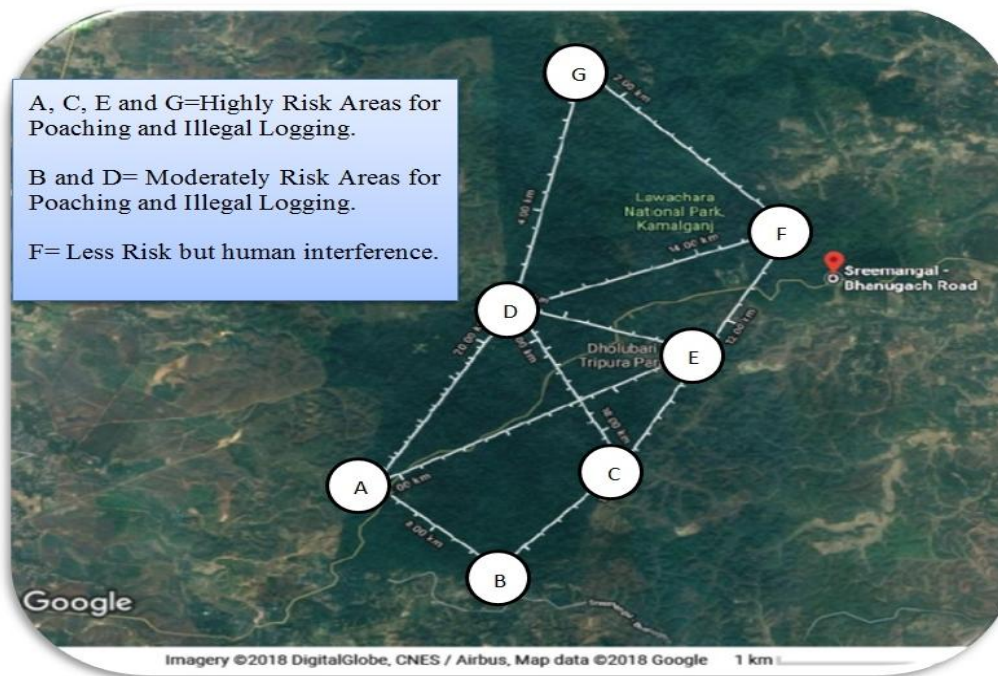
**Figure 3.** Impact of Misusing Technology towards Wildlife [8]

These animals were affected pain at tracheas by sensor networks, which were transmitted from the telematics technology as shown in Figure 3. During the experiment, it was also identified that the tracker tracked the animal through scanning temporal landscape including longitude, latitude and elevation using global navigation satellite system, which was connected with GPS and GPRS, cell phone and Wi-Fi networks. It is mentioned that the Automated Radio Telematics System includes wireless sensor network, active open eyes and switch-on smartphone. However, the study illustrated that loss of biodiversity at Lawachara National Park (LNP) occurs through the misapplication of modern technology, particularly macaque monkey declining.

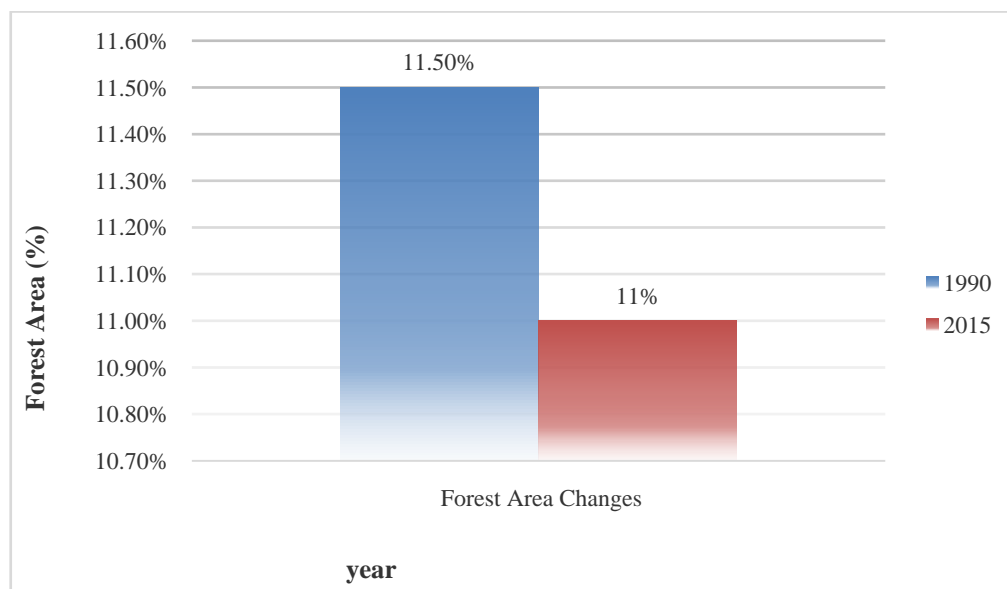
Due to misuse of advanced wireless sensor technology, the impacts of illegal logging are varied, ranging from unchecked deforestation to the deprivation of sustainable livelihood opportunities for local communities of Lawachara National Park areas. Besides, there are some areas; those are risk for illegal logging and poaching, as shown in Figure 4. The study also revealed the wildlife suffer from sensor

diseases like tracheal cancer, coronavirus disease, acute respiratory distress syndrome (ARDS), cardiac arrest, Numbness, Neurofibromatosis, Stomach cancer, Liver cirrhosis, falling down, fever, dermal disease etc. due to tracking with advanced wireless sensor device at a specific GPS location and active open eyes.

Here the symbols expressed as: A= Adjacent Bharaura, B= Adjacent Fulbari Tea Garden, C= Adjacent Magurchera, D= Adjacent Gilachara Tea Garden, E= Adjacent Langurpur, F= Adjacent Bagmara, and G= Adjacent Garobosti areas. Out of these areas, adjacent area of Bharaura is the most highly risk area for poaching and illegal logging— according to the opinions of Focus Group Discussion and Informal survey. Moreover, Illegal logging tends to deforestation, which creates loss of LNP's biodiversity. According to World Bank (2012) estimates, illegal logging is the results in a loss of approximately USD 5 billion in tax revenue for government annually. Bangladesh Forest Department (BFD) maintained its efforts to tackle illegal logging since the establishment of co-management system at LNP.



**Figure 4.** Risk areas in Lawachara National Park for poaching and illegal logging (Source: Google Map, 2018)

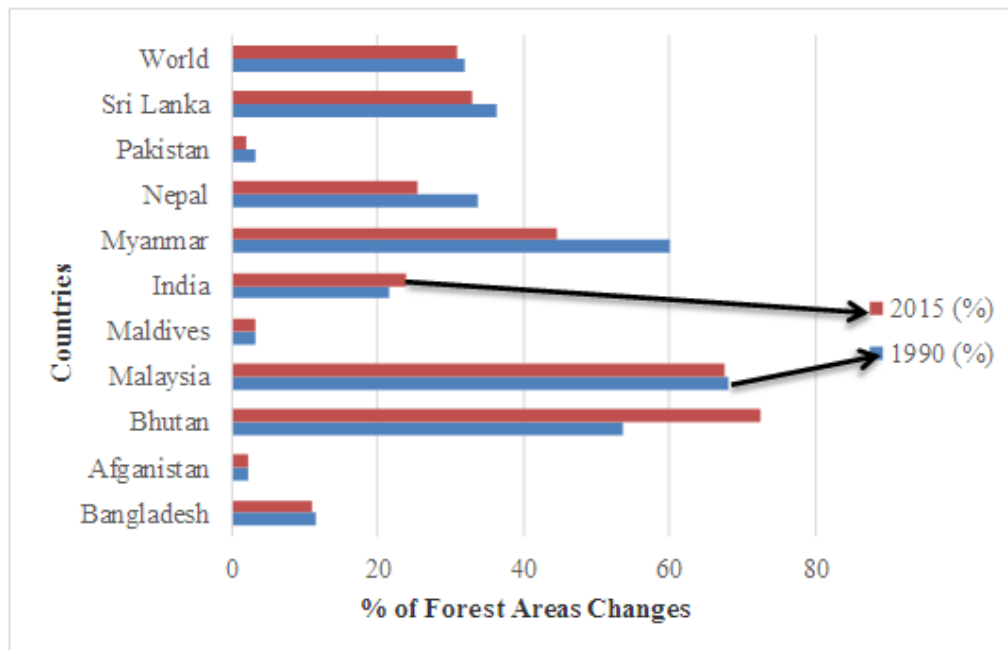


**Figure 5.** The percentage of Forest Area Changes from 1990 to 2015 in Bangladesh

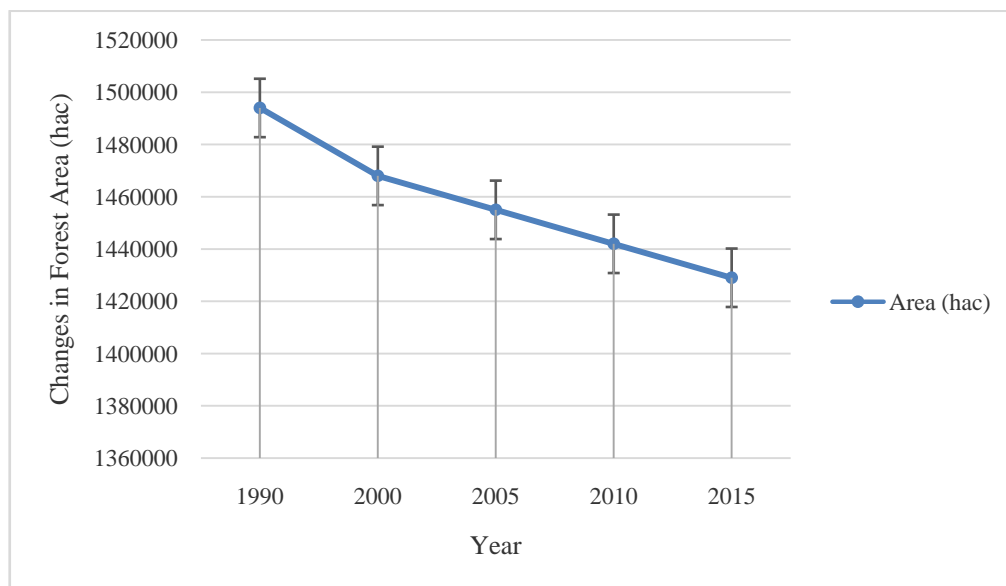
Conservation policy instruments exist at all stages of the policy process with specific tools— *in-situ* instrument, for example national park. From the result, it is shown that the Lawachara National Park has affected by the national conservation policy. This effect is required to national park's demarcation and recovery of encroachment.

The Aichi Biodiversity Target (ABT) indicates the national parks regions using to protect national biodiversity. According to specific objective of Target 11 of ABT (2010), every state party augments national parks, but decreases forest, which as shown in Figure 5. It stated in Chapter 2 of this thesis earlier that every member country should to

conserve 17% of landscapes and 10% of seascapes areas' biodiversity associated with operative reserved area-based protection. There is continued loss of forested habitats in Bangladesh. In Bangladesh, decrease forest area and increase loss of biodiversity due different parameters which is mentioned earlier. From Figure 6, the study observed that the percentage of forest area changes is 11.5% in 1990, and 11.0% in 2015 in Bangladesh [22]. This changes reflects on the national green economy as well as alarming on environmental issues. The study also compared with Malaysia and other countries in south-south-east Asia.



**Figure 6.** Forest areas changes in Bangladesh to compare in Southeast Asia



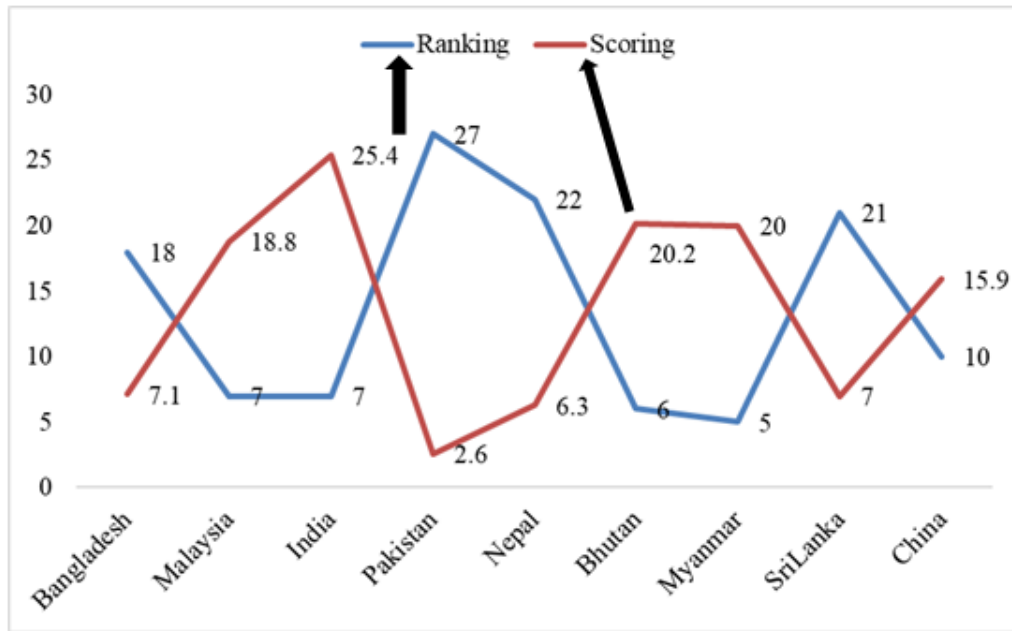
**Figure 7.** Changes in Forest Area in Bangladesh from 1990 to 2015

From the FAO report, the study illustrated that every year 26,00 ha forest area changes. In 2000, the total forest area 1468,000 ha, in 2005 and 2010, it was 1455,000 ha and 1442,000 ha in Bangladesh respectively. It was changes tremendously in 2015 as 1429,000 ha. Food and Agriculture (FAO)-2015 reported a gradual decline in forest area over the period 1990 to 2015 in Bangladesh. In 1990, the total forest area of Bangladesh was 1494,000 ha and in 2015 it became 1429,000 ha, as shown in Figure 7 [23].

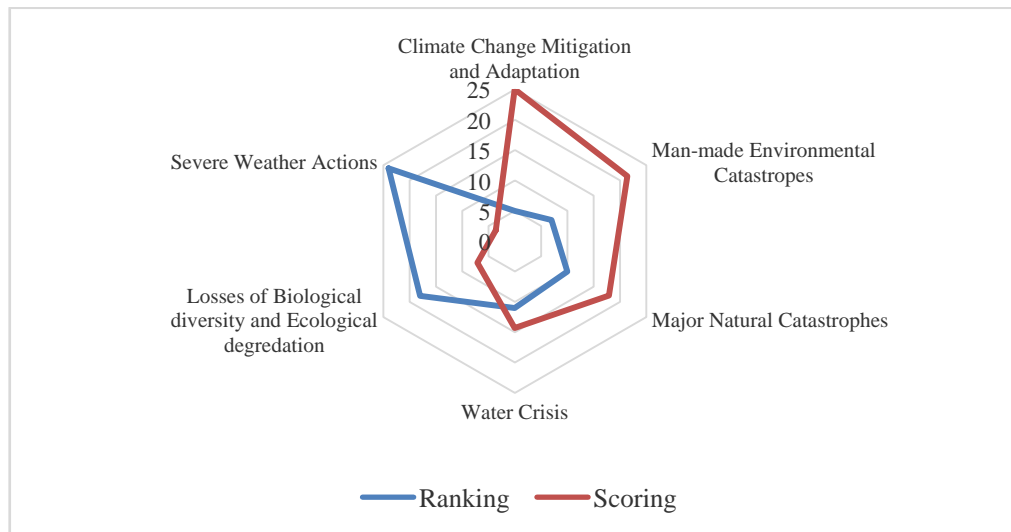
Lawachara National Park (LNP) is situated in Sylhet division, where comprises of evergreen forest and deciduous forest [28]. From the result of LNP's biodiversity

survey, it is identified that losses of species diversity of LNP gradually increased. The study assumed the losses of biological diversity and environmental dilapidation unexpectedly in Bangladesh. The losses rate of biological diversity [4] and bionetworks degradation increase gradually in this country. Figure 8, the scoring study observed the rank is 7 on favor of scoring 18.8 for Malaysia, whereas Bangladesh ranking 18 tends to scoring 7.1 [24]. The study indicates the losses of biodiversity, which influence negative impact in future on biological diversity and bionetworks services to the upcoming generations of BD.





**Figure 8.** The ranking and scoring of loss of biodiversity and ecosystem collapse



**Figure 9.** The most likely environmental risks in Bangladesh

Assessments of Informational Instruments for National Park's Biodiversity Conservation are highlighted elaborately in modern environmental informatics. Human beings live in the age of information with modernized technology. This informational instrument enhances the protection, storage, and sharing of information with rules & regulations to make a significant facet of economic, cultural and scientific affairs at scales from local to global [29]. It is clear that Information Communication and Technology (ICT) has become a driving force in the area of biodiversity conservation and the establishment and management of protected areas [30,31,32,33]. There is a great deal of academic discourse and debate around theories of the information society [34] and protected areas. Bangladesh is the most likely environmental risks, shown as Figure 9.

## 4. Discussion

The results of this study clearly demonstrate that '*in-situ*' environmental conservation policy instruments are more appropriate than legal and informational instruments for biodiversity conservation. There have been limited comparisons of appropriate legal and informational materials and conclusions have varied. In this study, the development of policy declarations produced by national parks and applications of the Biodiversity Clearing House process were analyzed as criteria for appropriate biodiversity conservation. The results of the existing policy instruments are inadequate in linking national and global perspectives, where there are some gaps, such as policy formulation, sectoral integration, declaration of national parks, establishment of digital



preservation. However, this study includes stakeholder engagement model development, policy improvement criteria, and enhanced frameworks for national park biodiversity conservation and sustainability, priority-based reasoning models for community-based conservation, and assessment of the use of updated technologies for biodiversity conservation. National Park of Bangladesh. The research indicates the uniqueness of the tools used to improve national park conservation professionals in the National Biodiversity Strategic Action Plan through existing policies and conservation technologies. Engaging with key stakeholders is essential to dialogue and recognize the challenges and potential solutions related to national park biodiversity loss and associated ecosystem service decline [25]. The research enables the dynamic evidence required for extensive data transfer and sharing, indexing, online publication and reporting to effective international organizations such as CBD in collaboration with Resources Information Management Systems (RIMS). The study gathered technical input from stakeholders such as park managers, biodiversity experts, network officers, environmental experts, policy-makers, wildlife managers, educators and relevant organizations, as shown in Figure 10.

Participatory dialogue comprehensive of multiple stakeholders is crucial to appreciate and discourse different perspectives and needs [26], and considered many benefits to policy and technology implementations (e.g., BCHM, greater legitimacy decisions, higher-quality decisions, increased compliance) [27]. This type of discussion can also familiarize stakeholders to potential policy concepts, based on information from other areas. Finally, the study advocates a new collaborative approach to drive the stakeholders' potentiality to further incorporate the information systems integrating next generations' biodiversity conservation

perspectives. The study suggested that engagement of stakeholders enhances the conserving of national park biodiversity with required policy guidelines.

National Park areas operate with rules and regulations for promoting and harmonizing of biodiversity policy through conservation systems, but these rules and regulations are inadequate due to expansion of insecure advanced wireless sensor technology towards plants and wildlife. These systems integrate with Information systems developing dataset biological diversity Information Systems (BDIS). The BDIS is a group of tools, which can increase the competitiveness and gain better information for decision making with relevant diversity's system and orders. Nearly 58% of respondents expressed their opinions for development of BDIS for Lawachara National Park [8], which connects with geospatial technology, biodiversity clearing house mechanisms, IOBIS and modern conservation technology. But till to date, there is no effective Park Area Management Control Unit (PAMCU) including biodiversity database, clearing house mechanisms (CHM), visitor's database as well as information systems in developing countries and other local places. The study represents alarming on environmental diseases like tracheal disorder and cancer, coronavirus disease, onset acute respiratory distress syndrome (ARDS), sudden cardiac arrest, sudden numbness, neurofibromatosis, stomach cancer, liver cirrhosis, falling down, fever, dermal diseases (like tinea corporis, erythema gyratum repens, contact dermatitis) etc. due to misuse of wireless sensor devices with clouding networking system [15,17,35,36,37,38,39,40,41,42,43,44, 45]. Furthermore, man-made technological climate crisis, heatwave, flash flood, wildfire, landslide occur due to tracking with wireless sensor technology [10,12,15,16].

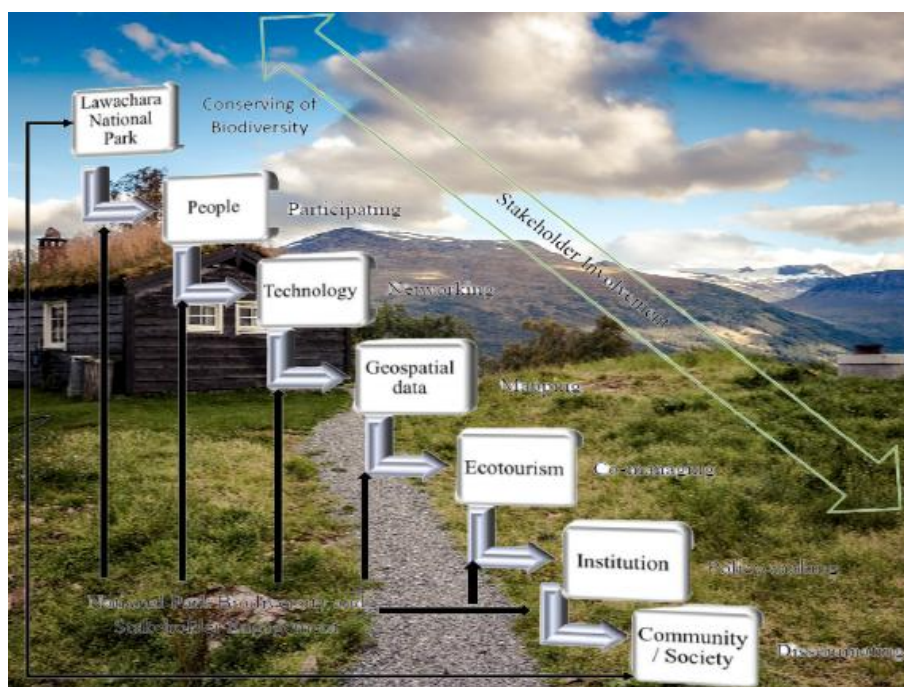


Figure 10. Stakeholder Engagement on National Park Biodiversity

## 5. Conclusions

In conclusion, the study evaluates three of the four types of conservation instruments of the Convention on Biological Diversity. These are legal, in-situ and informational instruments for developing countries including National Parks (NP) – as a study site. Based on these instruments, national parks are not well managed based on the effectiveness of national park management and the prioritization of political commitment to biodiversity conservation. However, this study attempts to develop a complete scenario of under-management factors in conserving NP biodiversity in developing country. The findings of this study clearly indicate that any national park database is an important resource in relation to traditional forest policy, misuse of advanced wireless sensor technology, illegal logging, wildlife poaching, collection of NTFPs, parkland encroachment, invasive alien species and biodiversity clearing house process for loss of biodiversity in national parks. The results of this study support the adoption of environmental conservation policy instruments linking with secure wireless sensor technology that create National Park Biodiversity Protection worldwide.

## 6. Declaration

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### *Data Availability*

The data being used to support the findings of this research work are available from the corresponding author upon request.

### *Competing Interests*

The authors declare no potential conflict of interests in this research work.

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## Appendices

Misuse of Advanced wireless sensor technology to Loss of Global Biodiversity

- a. Climate crisis and heatwaves in Europe 2022, URL: <https://www.weforum.org/agenda/2022/07/heat-wave-s-economy-climate-crisis/>
- b. Europe is facing a record-breaking heat wave and drought across the continent | DW News, Jul 7, 2022, URL: <https://www.youtube.com/watch?v=qgXxgY OJNQ>
- c. Spain heatwave brings record temperatures - BBC News, Jun 14, 2022. URL: <https://www.youtube.com/watch?v=MEEbiNc1v5s>
- d. Global warming: scorching heat makes life unbearable in Pakistan | DW News, May 18, 2022. URL: <https://www.youtube.com/watch?v=xFFk2be35VE>
- e. Heat wave reaches peak in France, "no end in sight" for record drought, Global News, Aug 4, 2022. URL: <https://www.youtube.com/watch?v=mXsCjAxUWU Q>
- f. Wildfires in Europe spreads north as wildfires rage in the south | DW News, Jul 18, 2022. URL: [https://www.youtube.com/watch?v=S91HEBv\\_Gf0](https://www.youtube.com/watch?v=S91HEBv_Gf0)
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- i. Wildfires, heatwave, and drought in Europe affecting food production, infrastructure, CBS News, Jul 21, 2022. URL: <https://www.youtube.com/watch?v=XR U2zvNcg3M>
- j. Mexico Declares State Of Emergency Over Worsening Drought, NBC News, Jul 27, 2022. URL: <https://www.youtube.com/watch?v=VMQMJ1dpCR0>
- k. Massive Landslide worldwide due to misuse of wireless sensor technology URL: [https://www.youtube.com/watch?v=\\_r34OWZCW4g](https://www.youtube.com/watch?v=_r34OWZCW4g)

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