



Vulnerability And Risk Assessment Of Economy During Covid-19 Pandemic Waves In Digha Coastal Tourism Of West Bengal, India

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Abstract: Digha, a well-liked tourist destination over Bengal coast is reflected as a typical example of the finest coastal beaches in India and have been featured by twin developmental processes like tourism and urbanization for last two decades. Eventually, this tourism townscape has been shocked by the COVID-19 waves distressing the bases of regional livelihood and development. The aimless tourism industry has been shifted towards a status of fiscal stun due to lockdown-slowdown progress for about 2-years. Tourist tone with its infrastructure, services and setting mirrors a desert glance as COVID consequence. Accordingly, the local cum regional economy and livelihood have been faced on the massive economic defeat estimating Rs.2300 crore slashing its bliss of drive and progress. The study reflects the risk of occupational uncertainty and life insecurity shaking the living of the depended populace connected with this economic dream ground. Thus, this industry and facts frankly require sustaining the life, livelihood and development for breathing from pandemic challenges. The essence of the research draws the feels and reality of the human costs assessing the vulnerability and risk of the tourism townscape and shows the efforts to find out the optimistic pathway to save it from the frame of trouble.

Index Terms - COVID-19 waves, fiscal stun, economic defeat, pandemic challenges, vulnerability and risk.

1. Introduction

COVID-19 pandemic and its journey on the runway of two years have brought the massive declines in both economic and social sectors of the impacted nations (ILO, 2020; IMF, 2020c). The whole of the anthropogenic globe has been fallen into the decay and darkness of economic loss and livelihood crisis on the way of development and advancement of life and nation which being never-experienced-before (McKibbin & Fernando 2023). This pandemic has kept its signature at all, from kitchen to corporate sectors, from manufacturing to service sectors and individual's household to global fiscal ground (Naseer et al., 2023). The strain-slowdown effects has been affecting the productivity and demands with markets as the lockdown and social distancing are the lone cost-effective gears essential to stop the swell of COVID-19 (Chaudhary et al., 2020; Zhang et al., 2020). It is also estimated that the tourism industry in India is projected to face more than Rs 1.25 trillion loss in the year of 2020 due to this pandemic (Dash, 2020). Not only in India, but also the neighboring countries like Bangladesh also faced the acute tourism related crisis for this situation (Dutta & Smita, 2020; Akter, 2021).

Tourism is emerged as the spine of many nations' economy in the latest globe (Abuamoud et al., 2022). It has become a giant basis which is supportive to breed large income in terms of a way of internal revenue and overseas exchange (Kumar, 2020 ; Hasan, 2020). In fact, tourism industry inherently interlinks many more profitable downstream like transport and travel, hotel sector, catering services, recreation and amusement amenities, local markets of customer and art craft goods and services, etc. (Abbas et al., 2021). Different tourism enterprises encourage its advancement stimulating the intensification of income and generating the earning platform throughout multiplier effect.

Having the stamina of regional and national economies for India, tourism is flourishing as the trigger of economic escalation gifting the scope of life earning and providing the multi-facet opportunities of socio-economic development (Singh, 2020; Maiti, 2022). In case of our country, tourism draws 10-12% GDP of the total having a great contribution to national economy (Mallapur, 2020). COVID-19 has been diffusing hastily throughout the world and has been scaled as the worst ever health risk disaster threatening life and livelihood (Steni, 2020). Globally, tourism economy is the nastiest exaggerated by COVID catastrophe. The World Tourism Organization (UNWTO, 2020 & 2020a) assessment predicts a collapse of 20–30% in worldwide tourist influx. Millions populace allied to tourism are at their job loss and uncertainty (UNSDG, 2020; Chakraborty & Chatterjee, 2020). The report by FICCI-Yes Bank, 'India Inbound Tourism: Unlocking the Opportunities' designated India as the tourism powerhouse and the South Asian biggest market whereas 9.2% GDP regarding the industry has facilitated US\$247.3 billion with 26.7 million jobs in 2018. Now India has become the 8th largest GDP contributor from tourism in the globe (Jagan Mohan, 2020). The report opined also; the tourism is anticipated to afford earnings of about 53 million people by 2029. Unfortunately, the COVID has constrained the global transportability. Consequently, the breakdown income from the tourism has shown the drastically down falling in the GDP growth curve which predicts 0.45% collapse in GDP growth rate (Chaudhary et al., 2020). Federation of Associations in Indian Tourism & Hospitality (FAITH) has already expected the double loss for Indian tourism predicting about Rs. 10 lakh crores hammering from COVID pandemic (The economic Times, 2021). The PTI (March, 2020) has also primarily forecasted to the government estimating the loss as Rs 5 lakh crore from the industry.

Historically, Digha, is complemented as the 'Beerkul', i.e., 'Brighton of the East' (National Informatics Centre Archived, 17th Feb, 2006, Retrieved 2nd April, 2006) mentioned in one letter of Warren Hasting to his wife (1780). Later on, an English tourist John Frank Smith visited (1923) and captivated by its loveliness. In fact, he settled here and wished-for to Dr. Bidhan Chandra Roy, first ever Chief Minister of West Bengal in Independent India for crafting it as a tourist destination (DSDA, 2015). Eventually, during the ninety's decade of 20th Century it was appeared as a significant tourist end of South Bengal. Today, Digha is signified as the platform, functional operative and regulator of earnings, livelihood and development to not only the region, but also the state.

The study area, Digha along with its satellite destinations like Sankarpur, Tajpur, Mandermoni, Junput, Dariapur and Hijli on and along the coastal edge of Rasulpur-Pichhabani Basin over Midnapore seaside in South Bengal offers one of the most popular stay grounds from the intention of recreation and resorting relating travel-tourism and also research. Recently, it has been more dignifying by the annual average of about half crore tourists showing its promising growth with time. Digha, the Brighton of the East (Baitalik, 2016) has reflected a low graded superficial sand beach having more than 12 km lifeline (I-WIN Advisory Service Limited and DSDA. 2013-14). The pleasant loveliness of Digha having the moisture sand carpet, gentle waves and mild sunshine to the tourists has been rhythmic with coastline greenery of casuarinas. This tourism hotspot of Bengal with an added attraction, sea fishing shows the superfluity of life earning panorama locally, regionally and abroad (DSDA, 2015). In Digha, fishing is the very significant supplementary font of employment cohort like tourism. About a lakh of local and regional demographic mass-figure is influenced directly and indirectly by its tourism and other related economic sectors suited with enriched coastal background. Undoubtedly, there will be a strapping intensification of employment prospect due to the amazing development of tourism in the study area (Das & Mondal, 2021). Unfortunately, prosperity of the study area has been infected by COVID-19 outburst under national as well as global pandemic umbrella for last two years.

This manuscript has been afforded to emphasize the human costs of COVID issue in this budding tourism townscape hampering regional livelihood and development. This research paper may be the decisive tool to the policy makers and thinkers for assessing the COVID crisis at any tourism landscape. Unquestionably, enlightening the economic shock to the industry and job uncertainty to earners is the germane task from the side of authors. Through this research attempt, the researchers are trying to outline the life sustaining way for both livelihood and development of the tourism townscape against not only the COVID crisis, but also the likelihood disasters in near or far future.

Keeping all the above discussion in mind the main objective set for this research is to assess the vulnerability and risk of lives and livelihoods of people during lockdown periods of COVID-19 Pandemic.

2. Study Area

Geo-environmentally, Digha tourism townscape is situated at the most western coastal flank of West Bengal having the geo-referencing as 21°36'40" N - 21°38'20" N and 87°29'10" N - 87°32'40" N on the latitudinal and longitudinal scales respectively. The study area is a recent coastal sedimentary and alluvium formation of Quaternary (6000-8000 BP) along with its finest sedimentological set up and beach reflection (Das & Dandapat, 2014). Geomorphologically, it is the unique signature on the Pichhabani-Subarnarekha Interfluves having the western edge of Rasulpur-Pichhabani Sub-basin on South Bengal Basin. Although Digha has been dignified as the Khadalgobra Census Town in 2011, administratively it is composed of about 20 populated and depopulated mouzas having rurban behavior under Padima -I and II GP of Ramnagar-I CD Block of Contai Sub-division in Purba Medinipur District, West Bengal. Functionally, the study area has been mirrored as one of the important tourist destinations in Bengal enveloped by the trio as fishing, tourism and urbanization and facilitated by resourceful potential coastal habitats and ecosystem (figure 1). The location details are presented in table no. 1

Table 1: location details of the study area

Name of Coastal Stretch	Name of Tourism Sectors/ Pockets	Location of the Study Area					
		Geographical Location		Geographical Area (sq. km)	Administrative Location		
		Latitude	Longitude		GP	CD Block	Others
Digha Coastal Stretch on Pichhabani-Subarnarekha Interfluves	Digha Tourism Sector (Udaypur-New Digha-Old Digha-Mohana)	21°36'40" N - 21°38'20" N	87°29'10" N - 87°32'40" N	9.6342	Padima -I & II	Ramnagar	P.S., Contai Sub-division, Purba Medinipur District, West Bengal

Source: GIS Software Analysis and Administrative and Institutional Report

LOCATION MAP OF THE STUDY AREA

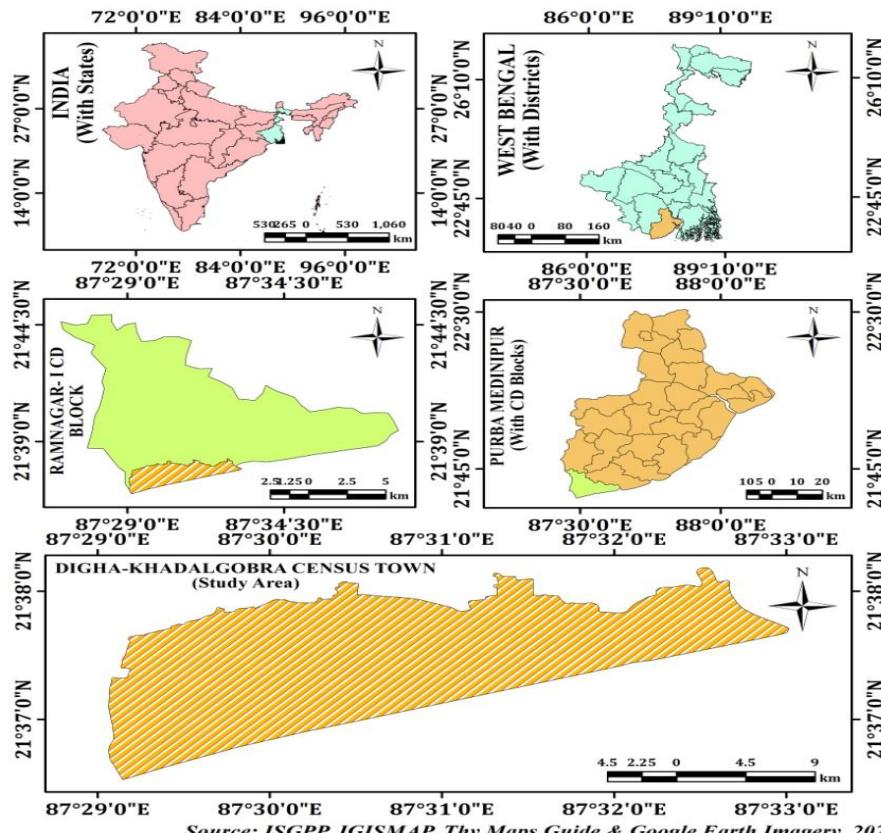


Figure 1: location map of the study area

3. Materials and Methods

The study on the costs and management of the outbreak of COVID-19, this deadly virus in Digha coastal tourism townscape has been conducted maintaining a systematic tentative route chart as given in figure 3.

The selection of the study area has been emphasized because of its most popular and overcrowding tourism dignity in South Bengal during last one and half decade. Not only that, huge cash flow, a large number of employments, influencing the regional livelihood, stimulating local to state economy and prosperous growth and development by tourism cum urbanization along with other allied sectors have been tremendously affected by COVID-19 pandemic for last two years.

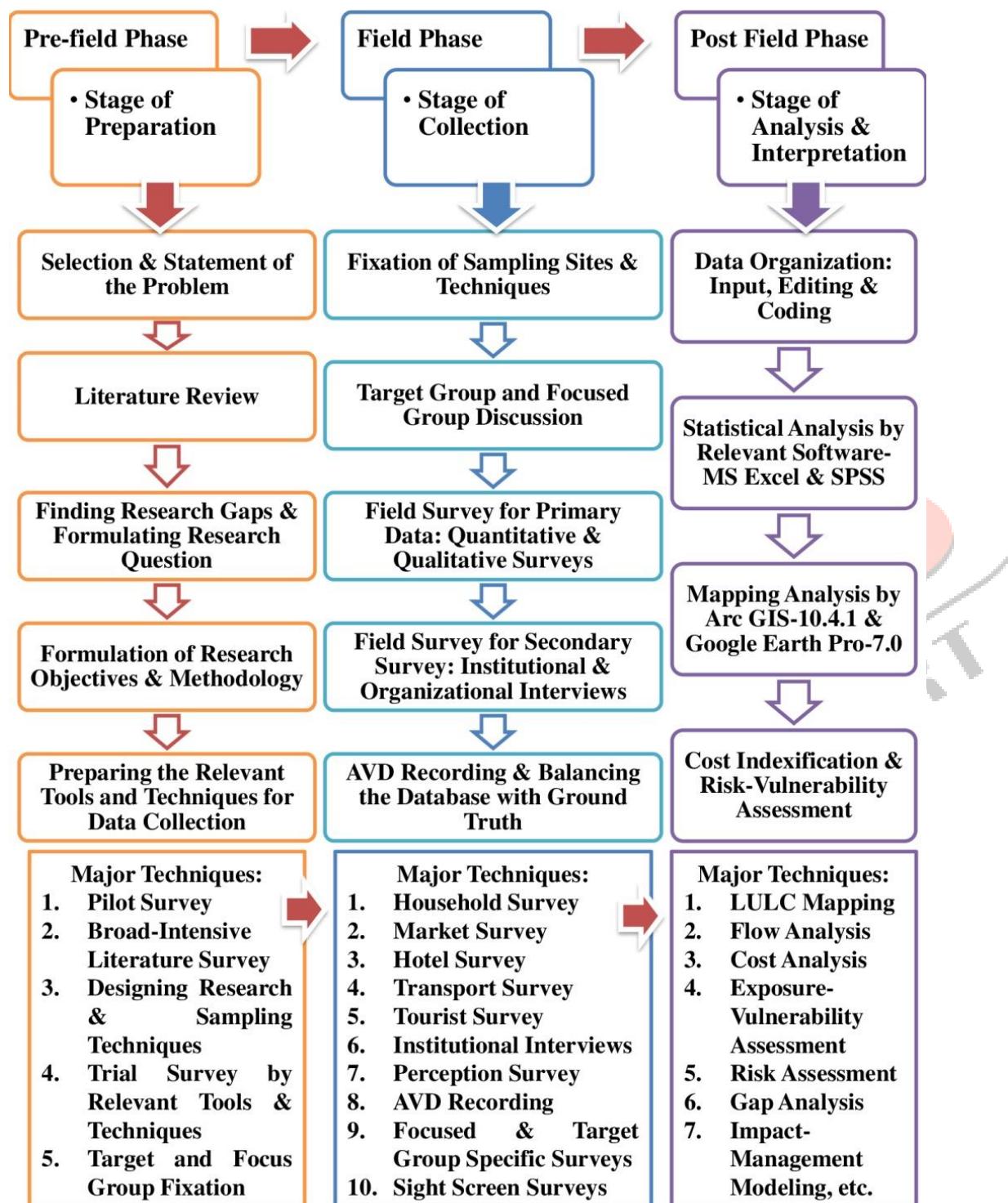


Figure 2: methodological flow chart showing the comprehensive methods and techniques for the study

Figure 2 indicates the ways and purposes of various sampling techniques used for the study. Total number of respondents is 720 selected from household, hotel, market, transport, tourists, fishing, tourism and other institutions, etc. for assessing the costs of the pandemic here and rests are chosen for perception and quantitative survey for vulnerability and risk assessment from tourism and allied sectors.

Different quantitative and qualitative surveys and interviews are considered extensively to fulfill the target of research. Various surveys in individual specific, institutional interviews, sector wise perception studies have been conducted using personal, official, organizational and institutional interactions with the help of semi-structured and non-structured questionnaires through telephonic and face to face conversation during relaxation periods.

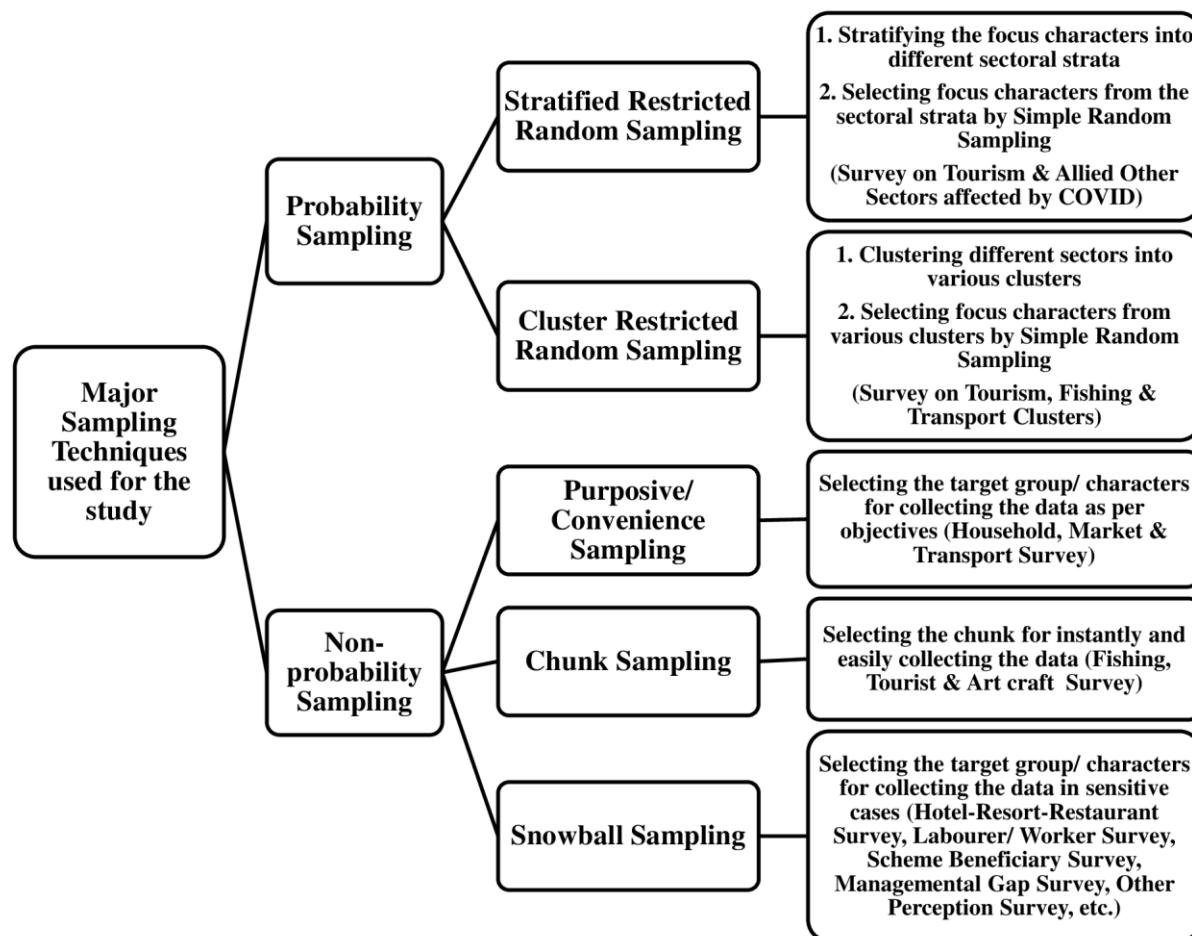


Figure 3: major sampling techniques used for the study
source: by authors

Table 2 shows major extracts from data analysis mentioning relevant databases with source, used tools and techniques and applied methods during post field stage.

Table 2: extracts, used database and applied tools, techniques and methods for the study				
Extract	Database	Source of Database	Tools & Techniques	Applied Method
Location Map (On the Basis of District & CD Blocks)	ISGPP & Google Earth Imagery-2021	ISGPP- II (Panchayats & Rural Development Department, Govt. of West Bengal) & SIO, NOAA, U.S. Navy, NGA, GEBCO Image Landsat/ Copernicus	Arc GIS (v.10.4.1), Google Earth Pro (v. 7.0) & Mapping Analysis	GIS Software Analysis
Magnitude/ Flow/ Influence Maps	IGISMAP, ISGPP, GPS Survey & Google Earth Imagery-2021	IGISMAP, ISGPP- II (Panchayats & Rural Development Department, Govt. of West Bengal) & SIO, NOAA, U.S. Navy, NGA, GEBCO Image Landsat/ Copernicus	GPS (GARMIN Montana- 680 & Garmin Oregon- 650), TCX Converter (v. 2.0.30), Google Earth Pro (v. 7.0), SPSS (v. 18.1) & Statistical and Mapping Analysis	Statistical Analysis & GIS Software Analysis

Land Use Land Cover (LULC) Map	IGISMAP, ISGPP & Google Earth Imagery-2021	IGISMAP, ISGPP-II (Panchayats & Rural Development Department, Govt. of West Bengal) and SIO, NOAA, U.S. Navy, NGA, GEBCO Image Landsat/ Copernicus	GPS (GARMIN Montana- 680 & Garmin Oregon- 650), TCX Converter (v. 2.0.30) and Google Earth Pro (v. 7.0) & Mapping Analysis	GIS Software Analysis	
Vulnerability and Risk Index Assessment	Primary and Secondary Databases	Purposive Field Survey, 2018-'20 Quantitative Qualitative Collection Institutional Literature Survey	for and Data & and	Target based Questionnaire, Survey Schedule, Field and Issue based Literatures, etc. & Systematic, Stratified and Purposive Sampling, Target and Focused Group Survey, Database Experiment, Theoretical Analysis, Data Compilation, Data Synthetization and Analysis	Qualitative and Quantitative Data Analysis, Dimension Specific and Comprehensive Index Computation

Source: By Authors

For perception analysis, mainly Likert's 5 point scale has been used (Allen & Seaman, 2007; Robbins & Heiberger, 2011; Derrick & White, 2017; Jovanović & Lazić, 2020). For the assessment of vulnerability and risk of this pandemic vulnerability progression causal index has been estimated following the concept of the vulnerability of progression: Pressure and Release model (PAR) of Wisner et al., 2004.

4. Result and Discussion

4.1 General Statement about the Study Area:

4.1.1 General Demography and Economy of the Study Area:

Table 3: basics of demography and economy of digha tourism townscape

Influenced Total Population (2011)	Influenced Total Population (2011)	Influenced Total Population (2021)*	Decadal Population Growth (%)	Geographical Area (sq. km)	Population Density/ sq. km (Recent)	Number of CT & Mouza	Major Economies	Dominated Process
18345	22285	33670	51.09	9.6342	3495	1-Census Town & 18-populated moza	Travel and Tourism, Fishing, Fish Manufacturing & Marketing, Hotel Business, Service Sector, Cashew nut processing, local handcrafts, etc.	Tourism, Fishing and Urbanization

*Indicates projected population based on the compilation of provisional data from concerned authorities and institution

Source: Census of India-2011, GPs and Block Level Census and Provisional Data-2011 and 2020, Report of DSDA, 2012, 2014, 2018 and 2020-2021 (Project Final, Draft and Provisional Report)

The above table (table 3) shows the general population statistics and economic opportunities of Digha-Shankarpur – Development Area (DSDA). The economy of this region mainly revolves around the tourism which is now becoming one of the tourism hotspots in West Bengal. The present Government is trying to make Digha as one of the major tourism destinations in India. Enormous infrastructural development acts as pull factor for the nearby rural people to migrate at Digha area for earning their livelihood. Therefore, increasing tendency of population growth has been found.

4.1.2 Comprehensive LULC Scenario influenced by Tourism in the Study Area:

LAND USE LAND COVER (LULC) MAP OF THE STUDY AREA

[Digha-Khadalgobra Census Town, Purba Medinipur, West Bengal, India]

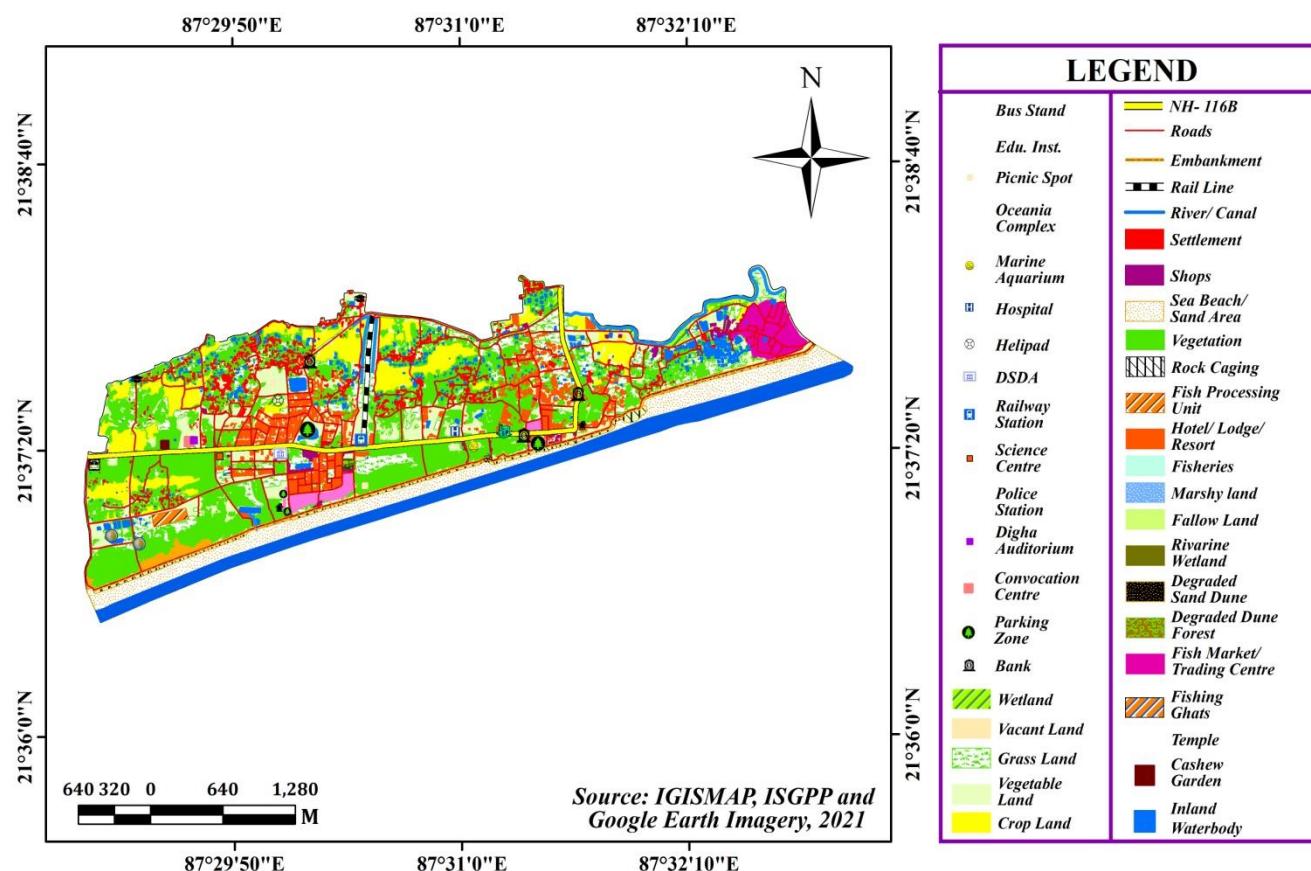


Figure 4: LULC map of the study area, 2021

The figure 4 shows the alarming encroachment of built-up areas into the natural environment. The mangroves, sand dunes, wetlands are invaded by the agriculture, buildings, markets, transport etc. it has been also evident that the agricultural fields are infiltrated by the hotels, resorts and commercial activities.

4.1.3 Tourist Flow and Magnitude at the Different Tourism Sectors in the Study Area:

Years	Table 4: yearly and daily tourist flow (lakh) in the study area													
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Daily	3641	13.29	Total											
3636	13.27	Domestic												
5	0.02	Foreign												
3808	13.90	Total												
3800	13.87	Domestic												
8	0.03	Foreign												
4189	15.29	Total												
4175	15.24	Domestic												
14	0.05	Foreign												
6978	25.47	Total												
6967	25.43	Domestic												
11	0.04	Foreign												
6751	24.64	Total												
6734	24.58	Domestic												
17	0.06	Foreign												
7252	26.47	Total												
7227	26.38	Domestic												
25	0.09	Foreign												
7449	27.19	Total												
7419	27.08	Domestic												
30	0.11	Foreign												
7652	27.93	Total												
7614	27.79	Domestic												
38	1.24	Foreign												
7551	27.56	Total												
7521	27.45	Domestic												
30	0.11	Foreign												
7849	28.65	Total												
7822	28.55	Domestic												
27	0.10	Foreign												
8052	29.39	Total												
8027	29.30	Domestic												
25	0.09	Foreign												
8559	31.24	Total												
8529	31.13	Domestic												
30	0.11	Foreign												
8890	32.45	Total												
8858	32.33	Domestic												
32	0.12	Foreign												
3438	32.55	Total												
3433	32.53	Domestic												
5	0.02	Foreign												
4447	32.23	Total												
4425	32.15	Domestic												
22	0.08	Foreign												

* Indicates the estimated figures in the draft reports from the authorized ends

Source: Final and Draft Reports of DSDA, 2013, 2014, 2018, 2019 & 2021

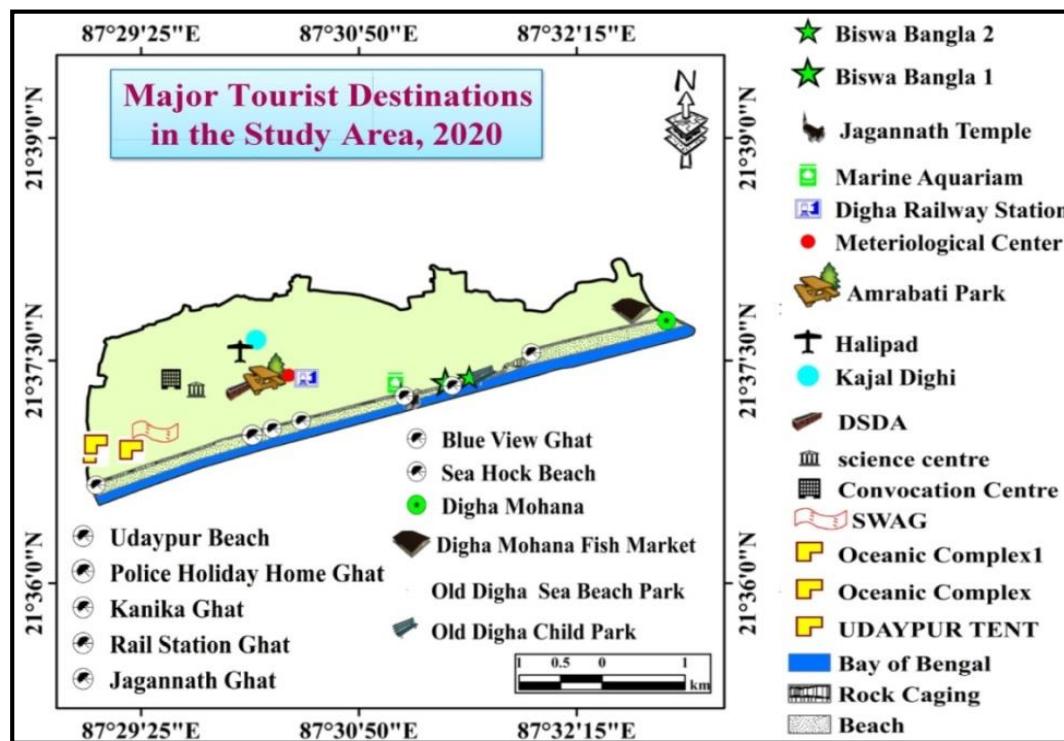


Figure 5: major tourist destinations in the study area

Table 5: Estimation of Amount and Magnitude of Tourist Flow in the Study Area

Name of Tourism Sector/ Pocket	Total Average Number of Tourists (Yearly, Monthly, Daily and During Peak Season)				
	Yearly	Peak Season (April- June)	Monthly	Daily	Daily in Peak Season
Digha Tourism Sector (Udaypur-New Digha-Old Digha-Mohana)	3245000	1974600	270417	8890	21940

Source: DSDA Report, 2017-18, 2018-19 & 2019-20 and Field Survey, 2018, 2019, 2020 & 2021

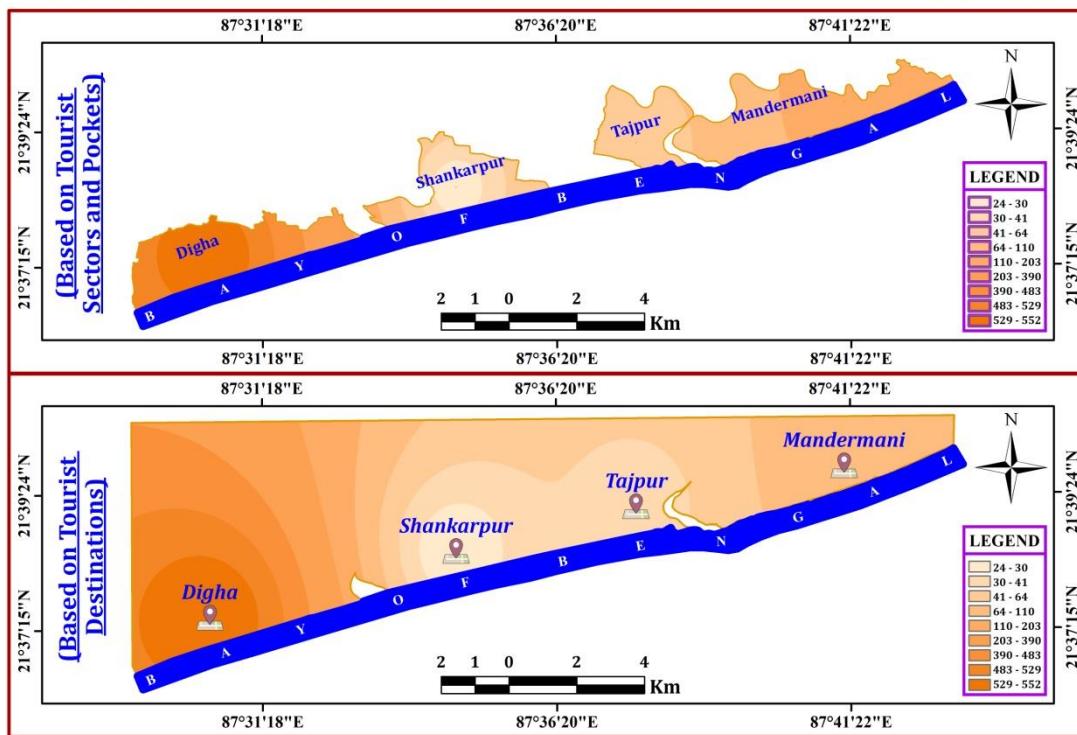
Digha area is now an important weekend tourism destination in West Bengal. All the year-round people come here for entertainment and pleasure. The major tourism spots are identified in the figure 5. The following tables (table 4 and 5) reflect the actual tourist flow from 2007 to 2021. The steady growth trend has been found from 2007 (13.29 lakh) to 2019(31.24 lakh). This trend is drastically declined in the year of 2020 due to COVID-19 Pandemic situation (12.55 lakh). Further, the wind is started to blow in 2021 (16.23 lakh). For the measurement of tourist flow, 21 major tourism spots such as Amaravati Park, Bathing Ghats of both Old and New Digha, Science Centre, marine aquarium etc. have been selected (Das & Mondal, 2021).

4.2 Economy and Employment Opportunities created by Tourism and Allied Industry in the Study Area:

Digha tourism industry is the only economic opportunities of Digha and its surrounding regions. It provides ample employment facilities for livelihood earnings in the sectors such as hotels, resorts, guest houses, restaurants, various shops, markets, vendors, hawkers, fishing etc. (figure 6). The following table (table 6) shows the huge clusters of hotels, shops, vendor etc. There are 39 Government and 307 and 206 unauthorized hotels of various sizes counted in this small tourist place. About 2937 number of vendors, 3327 licensed shops and numerous unlicensed shops are noticed in this area.

MAGNITUDE OF HOTEL INFRASTRUCTURE

[Digha, Shankarpur - Tajpur and Mandermani Tourism Sectors, Purba Medinipur, W.B.]



Source: IGISMAP, ISGPP, GPS Survey and Google Earth Imagery, 2021

Figure 6: magnitude of hotel infrastructure in the study area w.r.t. neighborhoods tourist destinations

Table 6: account of hotels, shops and vendors throughout the study area

Hotel in the Study Area

Sl. No.	Name of Coastal Stretch	Name of Tourism Sectors	Name of Tourism Pockets	Number of Hotels and Resorts			
				Government Sector	Private Sector	Unauthorized Uses	Total
1.	Digha Coastal Stretch	Digha Tourism Sector		39	307	206	552
Total (%)				7.06	55.62	37.32	100

Vendors throughout the Study Area

Name of Zones	Number of Vendors	% of Vendors
Old Digha Sector	1018	34.7
New Digha Sector	1855	63.2
Udaypur Sector	64	2.1
Total	2937	100.0

Licensed Shops

Old Digha	810	24.3
New Digha	1447	43.6
Udaypur	27	0.8
Other Different Markets	1043	31.3
Total	3327	100.0

Source: DSDA and Hotel Owner's Association Report & Field Survey, 2018, 2019, 2020 & 2021

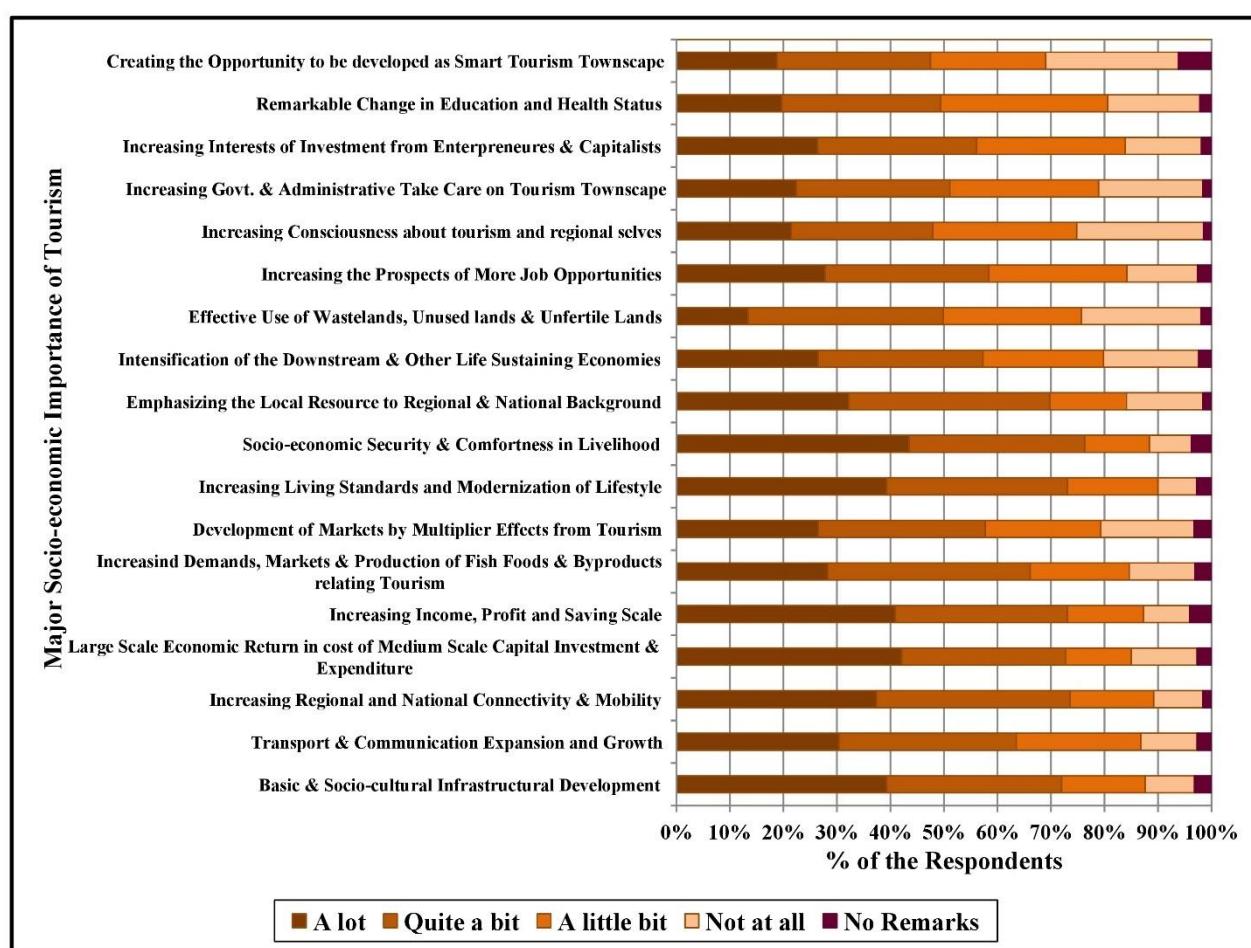


Figure 7: importance of tourism development in the study area

Source: Field Survey and Perception Study, 2018-2020

Figure 7 depicts the responses of the local respondents about the socio-economic importance of tourism on their lives and livelihoods. More than 60% respondents whole heartedly agree with the positive impacts of this tourism industry on their lives. They agreed that their lives and livelihoods were dependent on tourism in true sense.

Table 7: employees cum workers in tourism and allied economic sectors in study area

Name of Tourism Sector/ Pockets	Number of Employees & Workers in Tourism & Allied Sectors								
	Hotel, Restaurant, etc.	Lodge, Hawker, Street & Market Shop, Mall, etc.	Transport including Rickshaw, Auto, Toto, Tracker, Private Car, Bus, etc.	Tourist Institution/ Organization & Related Service Sectors	Fishing, Fish Manufacturing, Transporting, Exporting, etc.	Processing, Marketing, etc.	Govt. and Non-govt. Formal/ Service Sectors including Administration, Health & Education	Forestry, Livestock, Agriculture, Small Scale Handicraft, Work Man, Mechanics & Others	Labour Force in Various construction, renovation, repairing,
Digha Tourism Sector (Udaypur-New Digha-Old Digha-Mohana)	15500	8715	5155	1119	47794	646	668	2574	82171

Source: DSDA Report & Field Survey, 2018, 2019, 2020 & 2021

Table 8: employees and workers engaged in tourism and allied sectors throughout the study area

Name of Tourism Sector/ Pockets	Number of Employees & Workers as per Residence					Total
	Local (Within Ramnagar-I & II CD Blocks)	Regional (Outside Ramanagar-I & II CD Blocks, but within Purba Medinipur District)	State Level	National Level		
Digha Tourism and Allied Sectors (Udaypur-New Digha-Old Digha-Mohana)	48.3	19.3	30.8	1.6	82171	

The table 7 shows the employment picture of this tourism industry. Digha tourisms support both formal and informal sectors of employment opportunities rather it will be better to say that the informal sectors are more visible here. More than 80,000 people are engaged (table 8) in various sectors. Among the total workers, more than 48% people are local, 19% are from surrounding regions, 30% are from the other places of West Bengal state and 1.6% is in national levels (table 8). This data truly speak about the economic influence of this tourism industry.

4.3 Perceptions from Different Sectors of Region regarding the Socio-economic Cost of COVID-19 Outbreak and Its Lockdown Situation

The following figure (figure 8) shows the perception of local residents about the deadly impact of this pandemic on the socio-economic situation. About 89% are jobless, 92.2% people are facing income uncertainty and insecurity, 86.6% faces the awful situation of poverty and marginalization, 91.2% perceive on collapsing of market, economy and tourism system, 94.6% find the turndown of economic growth and development, 85.2% face the health care crisis and insecurity, 90.6% are in socio-psychological stress, 82.8% feel socio-cultural disruption, 76.5% see the social inequalities and segregation, 90.4% have to change their lifestyle, 86.8% face unsafe livelihood and overall 90% people find with fear of declining potentialities of this tourism industry.

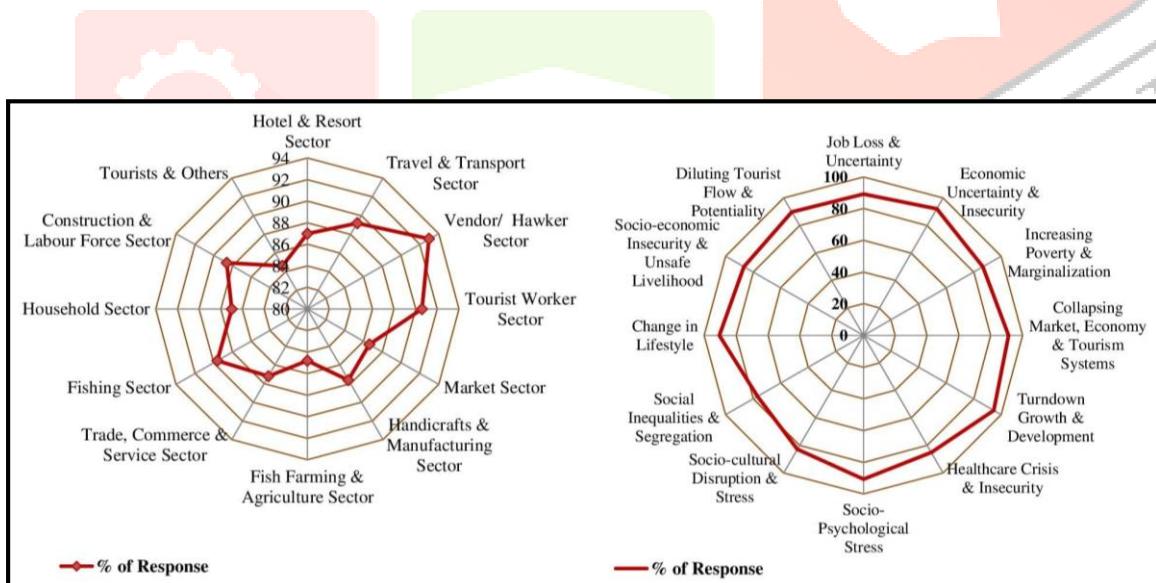


Figure 8: perceptions derived from different tourism sectors (left side figure) and regarding socio-economic costs (right side figure) of the people during covid-19 outbreak

4.4 Estimation and Assessment of the Economic Shock due to the COVID-19 Outbreak in Study Area

Table 9: estimation of the economic loss of tourism and allied sectors due to covid-19 in study area

Sl. No.	Name of Different Sectors related to Tourism and Allied Industries	Income Loss (Rs. /- in lakh) for different wave wise lock downs and unopened situation of Digha Sector				
		1 st Wave (More than 8-Months)	2 nd Wave (About 8-Months)	3 rd Wave (3-4 Months)	Total	%
1.	Hotel Sector	53365.43	31618.76	9802.91	94787.1	40.42
2.	Travel, Tourism & Hospitality (Agency & Organization)	7909.12	4666.65	1557.08	14132.85	6.03
3.	Vendors, Hawkers and Market Shops	3552.78	2451.46	637.14	6641.38	2.83
4.	Transport: Trackers, Auto, Toto, Rickshaw, Motor Van, Small Car, Local Bus, Long drive Bus, etc.	1118	592.54	171.19	1881.73	0.80
5.	Coast Guards, Nulia, Photographers, Tourist Guiders, etc. (employed as per casual basis through organization and agency)	288.82	167.04	61.92	517.78	0.22
6.	Small Scale Manufacturing, Art Crafts and so on	101.86	53.99	17.38	173.23	0.07
7.	Cashew Nut Processing and Food Processing	62.54	24.39	8.76	95.69	0.04
8.	Fishing, Selling, Processing, Manufacturing, Transporting and Trading	64500.78	20735.34	8747.81	93983.93	40.08
9.	Others (Distributors/ Suppliers, Service Man, etc.)	178.62	74.76	24.14	277.52	0.12
10.	Govt. Loss from Different Tourism & Allied Industry related Sectors	14500.18	5655.39	1839.69	21995.26	9.38
Total		145578.13	66040.32	22868.02	234486.47	100
Grand Total		= 234486.47 Lakh = 2344.86 Crore				

54780 (54.2%) employees (within the Ramnagar-I and II CD Block) are local and residual is regional (23450 within the Purba Medinipur District showing 23.2%) and outsiders (22850 outside the district showing 22.6%)

Source: Compilation of Secondary Data (DSDA, Digha Hotel Owners' Association, Fish Owners' Association, Fisheries Development Corporation, Various Labour's and Workers' Union, Market Unions, Different Tourism and Institutions, BDO, GPs, etc.) and Primary Data (Field Survey, 2018-2021)

The estimation of economic loss in monetary terms in tourism industry and allied sectors has been done on the basis of data collected from various secondary sources such as DSDA, Hotel owner's Association, Fishery Department, workers' union offices, Block Development office, Gram Panchayat offices etc and ground truth verification has been done through primary survey maintaining social distance in the relaxation periods of pandemic situation (table 9) The estimation shows an abrupt declining scenario of economic loss which is actually an economic shock to the workers, employees and even general public. The most affected sectors are hotel (40.42%) fishing related activities (40.05%). More than 62000 families of local and regional levels are harshly affected by this devastating pandemic in search of livelihood earnings.

The following flow chart (figure 9) clearly identifies the impact of economic shock of the total tourism system along side on society and security of livelihoods.

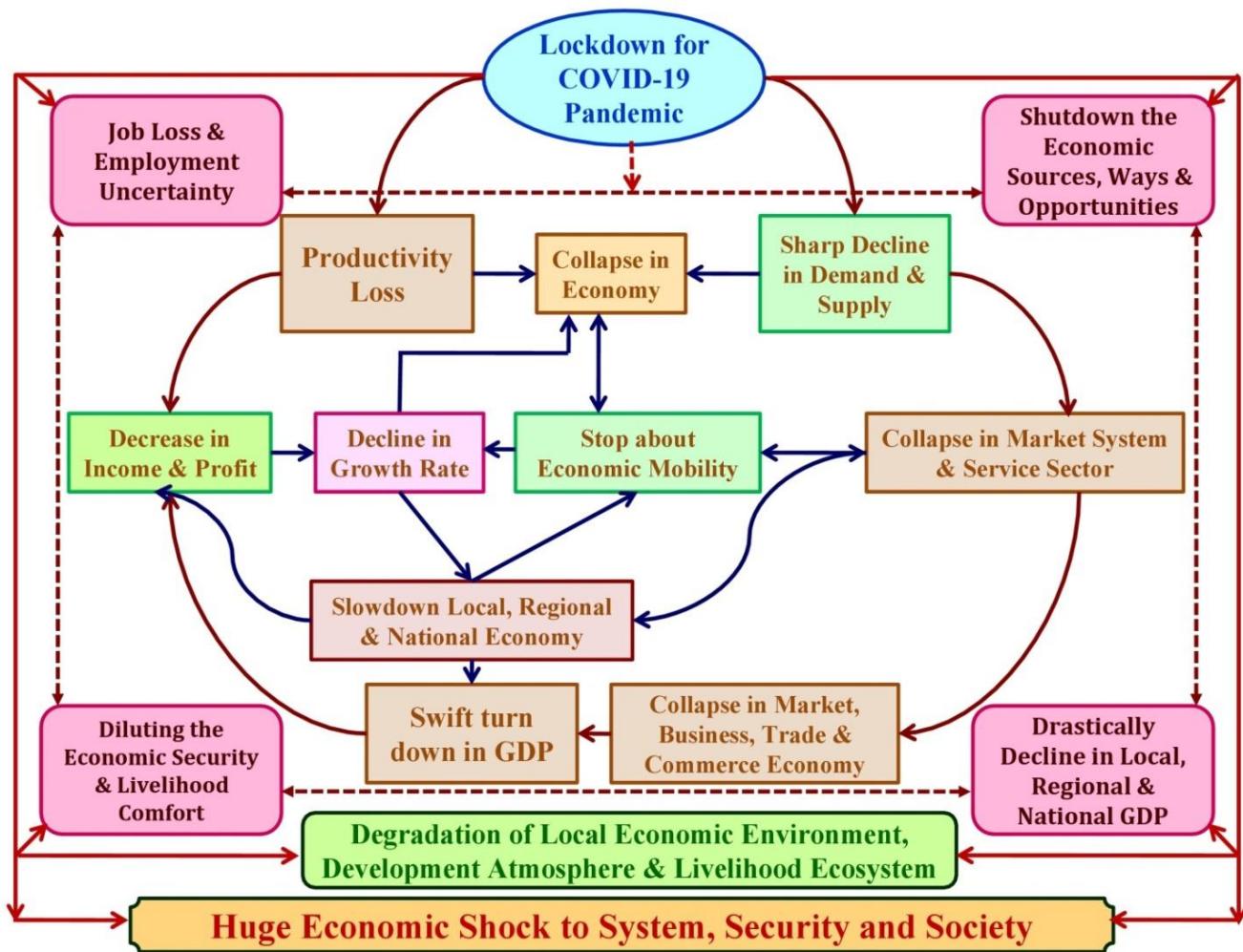


Figure 9: state of economic shock to the system, security and society in the covid environment of digha

4.5 Vulnerability and Risk Assessment of COVID-19 Pandemic Impact on Economy, Society and Development

This is the most important objective for this study. This pandemic put its imprint on every sector, every sphere of life and everywhere. The impacts are discussed in the following.

4.5.1 Estimation of Pandemic Cost Index (PCI) to the Respondents related to tourism industry:

Table 10: estimation of pandemic cost index (pci)

Dimension	Indicators	Weightage on 5-Point Scale	Dimension Specific Cost Indices	Pandemic Cost Index (PCI)
Economic Cost (EC)	Trends to job loss and uncertainty	4.50	ECI = 0.83	PCI = $(ECI+SCI+FCI)/4 = 0.803$ (80.3%)
	Top to bottom reduction in income and increase in poverty	3.75		
	Disruption in monthly small-scale deposits or running the life insurance policy	4.25		
	Loosening the pocket money for essential expenditure	4.50		
	Economic dependency on family/ others	4.00		
	Loosening the economic empowerment in the site and society	3.75		
Socio Cost (SC)	Reducing the health and education expenditure in the family	4.25	SCI = 0.79	
	Decrease in self-sufficiency and reliability in family	3.75		
	Decrease in demands and standard of living	4.00		
	Decreasing trend to consume modern amenities and services	4.00		

	Decreasing trend towards child-women-older care in family	3.75		
	Domestic violence and de-empowering the women employees and workers in the family and outside	3.75		
	Decrease in socio-cultural participation and activities	4.25		
Psychological Cost (PC)	Increasing stress, anxiety, depression and thinking disorder	4.75	PCI = 0.86	
	Increasing headache, fatigue and physical disorder	4.25		
	Concentration breaking in domestic works/ others	4.25		
	Feeling loneliness and boring at all	4.00		
Familial Cost (FC)	Relational conflict in inside and outside circles	4.00	FCI = 0.73	
	Ignorance in the family/ household and frequent family conflict, chaos and quarrel	3.75		
	Trend towards bad habits/ practices creating unhealthy atmosphere	3.25		

Source: Perception (Qualitative) Survey, 2020 - 2021

The researchers are trying their best to catch every sphere of life of the persons who are victimized in this pandemic situation. The Pandemic Cost Index (PCI) of 80.3% (table 10) clearly displays the grave situation particularly the economic conditions of the respondents. The economic crisis certainly put its impact on the social behavior, culture and family relations.

4.5.2 Estimation of Pandemic Vulnerability Index (PVI) to the Respondents related to tourism industry

Table 11: estimation of pandemic vulnerability index (pvi)				
Vulnerable Dimensions	Vulnerable Indicators	Weightage on 5-Point Scale	Dimension Specific Vulnerability Indices	Pandemic Vulnerability Index (PVI)
Demographic Vulnerability Index (DVI)	Vulnerable population in the family	4.25	DVI = 0.70	
	Family size & population density	3.50		
	Sex ratio	3.75		
	Literacy rate	3.25		
	Birth control/ family planning	2.75		
Economic Vulnerability Index (EVI)	Vulnerability to assets including all the infrastructure and property	4.25	EVI = 0.81	PVI = 0.7714 (77.14%)
	Vulnerability to savings	4.25		
	Vulnerability to access to credit	4.25		
	Vulnerability to marketing facility and capability for goods and services	4.25		
	Vulnerability from poverty alleviation schemes/ programmes	3.25		
Livelihood Vulnerability Index (LVI)	Assured employment	4.25	LVI = 0.81	
	Earning loss during pandemic	4.25		
	Insurance/ deposits facility/ scope	4.25		
	Alternative employment	4.50		
	Family status (rich/ higher middle class/ lower middle class/ marginal/ deprived)	4.25		
Social Vulnerability Index (SVI)	Vulnerability to social overhead capital	4.25	SVI = 0.81	
	Vulnerability to education and awareness	4.25		
	Vulnerability to health infrastructure and facility	4.25		
	Vulnerability to land and household ownership	3.25		

	Vulnerability to socio-cultural participation and empowerment	4.25		
Psychological Vulnerability Index (PVI)	Domestic violence, stress, depression and anxiety	3.75	PVI = 0.75	
	Relational violence, stress, depression and anxiety	3.75		
	Individual stress, depression and anxiety	4.25		
	Psycho-physical/ physico-psychological illness	3.75		
	Existing health problems of family member (s)	3.25		
Safety & Infrastructure Vulnerability Index (SIVI)	Vulnerability from communication tools	3.75	SIVI = 0.79	
	Vulnerability from household safety	4.00		
	Vulnerability from rights to women in family	4.00		
	Vulnerability from socio-economic safety	4.00		
	Vulnerability from empowerment in family and society	4.00		
Institutional Vulnerability Index (IVI)	Lack of disaster management plan and efforts	3.25	IVI = 0.73	
	Lack of advance warning, education and awareness system	3.25		
	Lack of institutional responsiveness	3.25		
	Lack of research and NGO activities	4.25		
	Lack of prevention, mitigation and preparedness and zoning	4.25		

Source: Perception (Qualitative) Survey, 2020 - 2021

The Pandemic Vulnerability Index (PVI) of 77.14% (table 11) clearly tells the ground truth of the impact of this deadly pandemic. This flourishing industry has been suddenly reached in a grave situation. The condition become worst for the daily earners engaged in informal sectors.

4.5.3 Estimation of Vulnerability Progression Causal Index (VPCI) to the Respondents related to tourism industry

Table 12: estimation of vulnerability progression causal index

Dimension	Indicators	Weightage on 5-Point Scale	Dimension Specific Causal Indices	Vulnerability Progression Causal Index (VPCI)
Root Causes	Limited Access:	Limited Access to Power	4	VPCI = 0.8133 (81.33%)
		Limited Access to Resources and Rights	4	
		Limited Access to Structure and Services	4	
	Ideologies:	Backwardness from Socio-Political System	4	
		Backwardness from Economic System	4	
	Dynamic Pressures	Role of Local Institution, Organization and Administration	4	
		Appropriate Skills, Training, Education and Awareness	4	
		Local Market	3.5	
		Ethical Standards	4	
	Marco Forces:	Rapid Population Change	4.5	DPI = 0.84
		Rapid Lifestyle and Livelihood Changes	4.5	
		Arms Expenditure	4.5	
		Debt Repayment	4	
	Physical:	Unprotected Infrastructure	4	

Unsafe Condition s	Low/ Marginal Income	4	UCI 0.80	=
	Socio-economic:	Special Group at Risk (Risky Livelihood)		
		Vulnerable Input and Production		
	Institutional:	Lack of Public Preparedness		
	Physico-psychological:	Weak and unsafe physiological and psychological conditions		
	Overall Safety and Security:	Lack of domestic and background safety and security		

Source: Perception (Qualitative) Survey, 2020 - 2021

The Vulnerability Progression Causal Index (Wisner et al., 2004) conveys the possibilities of sustenance of any hazardous situation. This pandemic creates a disastrous situation of these industrial activities at Digha tourism complex. The value of 81.33% VPCI (table 12) clearly indicates the high possibility of the progression of this situation.

4.5.4 Estimation of Risk Assessment Index (RAI) to the Respondents related to tourism industry

Table 13: estimation of risk assessment index (rai)						
Risk	=	Hazard	x	Exposure	x	Vulnerability
Risk Assessment Index (RAI)	=	Hazard Index Value (HVI)*	x	Pandemic Cost Index	x	Pandemic Vulnerability Index
RAI	=	1.00	x	0.803	x	0.7714
RAI	=	⇒ 0.6194 (62%) ⇒ **Higher risk of the COVID-19 Pandemic to the employees and workers engaged in tourism and allied sectors in the study area				

* Indicates the absolute numerical figure for its pandemic nature and deadly impacts to whole of the arthroscopic and its livelihood.
** indicates the remarks on risk assessment on the hazard, exposure and vulnerability whereas 0 – 20% ⇒ Lower Risk, 20-40% ⇒ Moderate Risk, 40-60% ⇒ Moderate to Higher Risk, 60-80% ⇒ High to Very High Risk and > 80% ⇒ Very High to Acute Risk

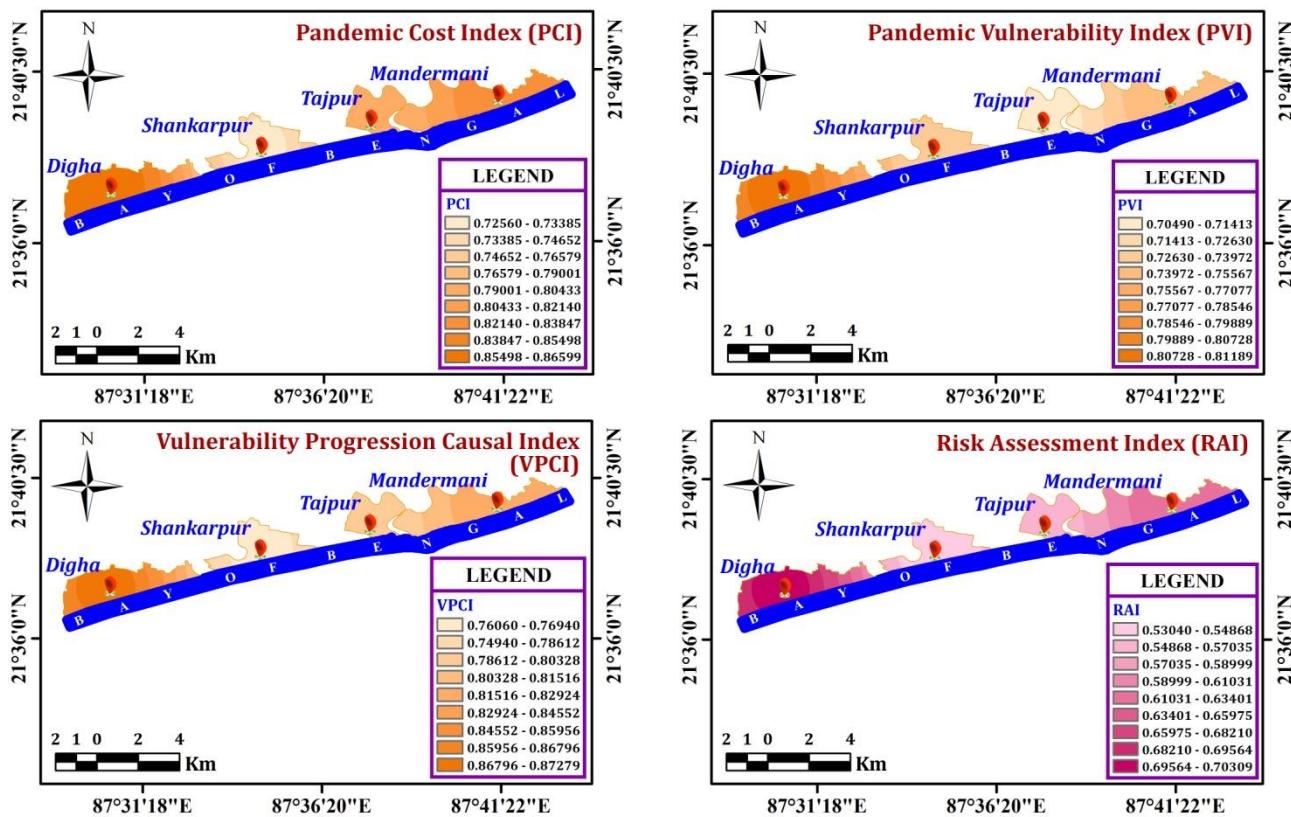
Source: Compilation of Exposure and Vulnerability Assessment Data Analysis, 2021

The table 13 reflects the Risk Assessment Index (RAI) to the respondent employees and workers, people in the study area. The enumerated value of RAI on an average scale is higher (RAI = 0.6194) which indicates the higher risk of the COVID-19 Pandemic to the employees and workers engaged in tourism and allied sectors in the study area.

The spatial scenario of these four indices such as PCI, PVI, VPCI and RAI are depicted in the following figure (figure 10) of the four important tourism destinations of Digha, Shankarpur, Tajpur and Mandarmani areas.

VULNERABILITY & RISK ASSESSMENT INDEX ANALYSIS TO ESTIMATE THE COVID-19 IMPACT ON REGIONAL LIVELIHOOD & DEVELOPMENT

[Digha, Shankarpur - Tajpur and Mandermani Tourism Sectors, Purba Medinipur, W.B.]



Source: IGISMAP, ISGPP, GPS Survey and Google Earth Imagery, 2021

Figure 10: vulnerability and risk assessment to estimate the covid-19 waves based lockdown impacts on the regional livelihood and development in the study area

5. Conclusion

Tourism industry is one of the key controllers of earnings, livelihood and development. COVID has become a famed catchphrase in the recent globe for the last three years. In fact, most of the socio-economic facets have been featured by a bitter crisis flaunt of massive constraints and confronts. Eventually, COVID pandemic has spectacularly distorted it. The shock to the industry and allied sectors in the study area makes it as paralysis reflecting a desert like look during the wave specific phase wise lockdowns. In this perspective, the consultant and coordinated policy for tackling the issue should be framed in integrated manner on the table of discussion by the government, administration, reliable authorities and organizations, associations and unions of employers and workers, regional public representatives, experts and technicians. This is the time to take urgent steps and make the far-sighted decisions to triumph over slowdown curve movement of tourism economy by COVID command. The clear-cut message for not only retaining the fallen down GDP, but also sustaining the life and livelihood in the zone should be sounded from the relevant sites of characters, communities and chiefs. Since, the capability for serving the natives and helping the dependents is out of control and subsequently we are intending towards sequential COVID lip-locked struggles for survival; the tourism industry in this region requires the absolute life sustain and liquidity to stay alive against non-stop COVID crisis (Kalra, 2020). Significantly, each hazard reflects a distinctive chance to turn back on the route for the advancement of society and its development. Although the escalation of COVID-19 deadly disease has deformed and decelerated the flourishing tourism and allied economy here in nervously; it may gift a new mass-momentum for new normal journey and development from the edge of this pandemic disruption and depression. Hence, tourism industry in Digha experienced with COVID terrible circumstances may tackle the superior challenges in turns of strong strategic encounters from government, policy makers and grounded people. In a final word, to overcome this paralyzed state of shocks and misbeliefs of the tourism sector and associated livelihood in this coastal rurban landscape, proper management and planning to restart and pick up the activities and the industry are needed from the integrated interference of all responsible corners.

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Ethics statement

It has been declared that this is an original piece of work by the authors. Manuscript has not submitted in any other journal for simultaneous consideration. The submitted manuscript is original and has not published elsewhere in any form of language. No AI is used for preparing the manuscript. Other ethical responsibilities are truly maintained as per best of our knowledge.

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