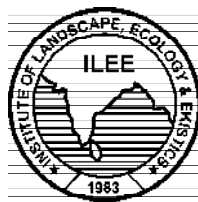


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Analysis of Sinuosity and Temporal Shifting of Channel Belt of the Kaljani River in the Foothills of the Eastern Himalaya, Cooch Behar, West Bengal, India

Koyel Roy¹ and Shasanka Kumar Gayen²

Abstract : *Changing nature of channel pattern and lateral shifting of rivers are common phenomena of the foothill of the Eastern Himalayas. The present study mainly concentrated on the assessment of changing nature of channel form and shifting of bank lines of the Kaljani River on a large temporal scale with advanced geospatial methods. The study also focussed on vulnerability assessment of the villages to the meander belt zone of Kaljani River for the period of 57 years (1962-2019). For the analysis of sinuous nature and lateral shift of the Kaljani river Sinuosity Index and Transect Method has been applied. Bank lines were delineated on toposheet and Landsat imageries and with the help of 12 cross-sections and after that lateral shift, migration rate and direction of the shift were also measured. From the result it is seen that increasing meander bend the lateral shift has an impact on the surrounding villages of Cooch Behar-II and Tufanganj-I blocks of Cooch Behar District.*

Key words: *Sinuosity Index, Lateral shifting, Meander belt, River Presence Frequency Approach.*

Introduction

Meandering river channels frequently shift their bank lines within their valleys confined within the vast alluvial flood plain of the Eastern Himalayas. They are naturally prone to shifting in response to variation of water and sediment discharge, tectonic instability, bank erosion, flood occurrences and human interferences (Lane and Richards 1997, Rinaldi 2003, Li et. al. 2007, Bierman and Montgomery 2014, Ghosh and Mistri 2015). The significance of quantification of changing nature of meandering rivers is not only limited in the arena of geomorphologists, soil scientists and hydrologists but also important for the environment planners to take precautions for the long-term river protection or developmental strategies (Dhar and Nandargi, 2000). The sinuous nature of the rivers, located in the foothills of The Eastern Himalaya, is also an important factor of channel dynamicity, which was assessed with the help of the Sinuosity Index. Friedkin (1945),

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Detecting Flood Prone Zones in Lower Keleghai River Basin Using Weighted Overlay Method in GIS

Nityananda Sar¹ and P. K. Ryngnga²

Abstract : *Flooding is one of the most devastating quasi-natural hazards in South-East Asian monsoon region. The recent study focused on flood risk zones (FRZ) by using multi-criteria evaluation (MCE) method with the help of Geographical Information System (GIS) of lower Keleghai river basin in West Bengal. For this purpose, post monsoon multi-temporal Landsat8 satellite imagery, topographical maps and Shuttle Radar Topography Mission (SRTM) Digital Elevation Model (DEM) data have been used to identify the severity level of flood risk area. To perform this study, different thematic raster layers of nine flood-conditioning factors integrated to prepare a flood-zoning map using Weighted Overlay Linear Sum Model (WLSM) in GIS environment. The method of training set and validation in different location in the study area of existing flood and prepared flood prone zone was been tested to validate the study. The results depicted that in general very low to severe flood risk zones found in the study area and the proposed multi-criteria approach of spatial layers in GIS environs provides a better assessment of flood risk zone. The outcomes of the study guide in developing comprehensive flood management strategies for efficient management in priority basis of present and future flood hazard in the area.*

Key words: *Flood Risk Zones, Multi-criteria Evaluation, Geographical Information System, Digital Elevation Model, Weighted Overlay Linear Sum Model, Flood Management Strategies.*

Introduction

Flood is considered as quasi-natural hazard and can have monumental impact on human societies all over world. It affects on average, 80 million people per year around the world. In estimation says 17.5 million people across South Asia are affected devastating flood event in 2020 and widespread flooding in India, Bangladesh, Nepal, Bhutan have affected 4 million of children (UNICEF Report, 2020). The major affected regions of India limited to the northern states of Assam, Bihar and West Bengal (Relief Web Report on flood and landslide, 2020). Nearly 46% of India's flood risk prone area lies within eleven states, of which about 35% of area lies within top two states namely Bihar and Uttar Pradesh. Major flood affected districts of the state in

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Significance of Finer River Bank Sediment Analysis on an Ungauged River: A Case Study of Rakti Khola on Darjeeling Foothill Region, West Bengal

Rajat Bar¹ and Subhadip Gupta²

Abstract : *The paper deals with the textural analysis of sand sized particles of bank sediments in a certain stretch along Rakti khola at Darjeeling Himalayan foothills. Rakti khola is a stream under the Mahananda River system. The finer bank sediments are collected from several layers of Rakti bank. The study gives emphasis on the textural analysis of finer sediments to understand the probable transport mechanism of such particles and depositional environment through which the particles have been settled. Mean of phi, skewness, sorting and kurtosis of fine sand have been used as statistical parameters. The sediment of surveyed bank layer shows the variation of textural parameters with a change of bank height. The variation refers the change in channel competency, occurred due to change in discharge regime.*

Key words: *Finer bank sediment, Textural analysis, Depositional environment.*

Introduction

There is great importance of the knowledge of textural characteristics of the riverine sediments for differentiating various depositional environments (Ramesh and Subramanian, 1992). Sediment texture deals with the various aspect of size, shape and three-dimensional arrangements of constituent grains of a sediment or sedimentary rock and these properties are closely related to the mode of transport and energy of the transport medium (Sonowal and Laskar, 2017). Sediment deposits are the result of combined effect of sediment transportation and stream hydraulic action in connection with the grain size distribution and energy fluctuation among the different river course in span of pre-monsoon, monsoon, or post-monsoon season (Bhattacharya, Chatterjee and Dolui, 2016). The grain size distribution is effected by the nature of source material, distance from the source, topography (Suvarna et al., 2017).

This paper deals with the study of transportation and depositional history and to identify the erodibility through bank sediment analysis. Wentworth (1922) studied about the sediment particles size on his paper, "A scale of grade and class terms for clastic sediments". Folk and

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Livelihoods and Wetland Resource Use: A Study on Selected Wetlands of Malda District, West Bengal

Diyali Chattaraj¹ and Subir Sarkar²

Abstract : *The present study has been conducted in four wetlands under the Tal and Diara physiographic divisions of Malda district. The study aims to assess the livelihood of the villagers through multipurpose utilization of wetlands. However, surrounding villages are categorised into two types; 1. Bed village (at immediate vicinity of wetland) and 2. Belt village (a bit far-off). A descriptive survey is used and a semi-structured questionnaire is administered to 1242 number of households, selected randomly (5 % of universe). The findings show that, the households, residing in bed villages are comparatively found more dependable as well as utilizing the wetland water for irrigation and cultivation of diverse crops (paddy, jute, pulses, maize, makhana etc.) followed by fish cultivation, fish catch (Baata, Kalbaush, Katla, Koi, Maagur, Prawn, Rohu, Tangra etc.), duck rearing and wetland products (macrophytes - thankuni, kalmi, hingcha; aquatic fauna - gugli, molluscs etc.) gathering. The study also found that the belt villagers are chiefly dependent on wetlands for commercial purpose, especially for makhana cultivation within wetland bed, to sustain the socio-economy of the poor mass in Malda district.*

Key words: : Livelihood, Bed and belt village, Economic benefit, Wetland potential, Human well-being.

Introduction

Ramsar Convention (1971) on wetland of international importance uses a particular broad definition of wetlands in Article 1: "... areas of marsh, fen, peat land or water, whether natural, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine waters the depth of which at low tide does not exceed six meters [20 feet]" (Ramsar Convention, 1971). The wetlands are among the world's most biologically productive ecosystem which have been analysed as 'biological supermarkets' (Mitsch & Gosselink, 2015) because of the extensive food webs and exceptionally rich biodiversity they promote (Ramsar Convention Secretariat, 2016). These are the places where water accumulates for sufficiently long periods of time and contribute significantly to sustain life processes (plants and animals). It provides year-round habitats for a wide range of vertebrates and invertebrates and wintering sites for migrants. There are some studies available on the wetland valuations. For example, Ramachandra et al., (2005) have discussed the linkage between use values and ecosystem functions of wetlands in

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Assessment of Groundwater Quality using Statistical Techniques of Balasore District of Odisha, India

Sasmita Mohanty¹ and Damodar Panda²

Abstract : *Geochemical studies of groundwater have been carried out in Balasore district of Odisha state. The analyses of water samples of the district reveals the physicochemical parameters of the district. The physicochemical parameters studied are p^H , Total alkalinity, TDS, EC, TH, Ca^{++} , Mg^{++} , Na^+ , K^+ , Cl^- , HCO_3^- , etc. The results are examined with reference to the drinking water quality standards as per BIS (I.S. 10500:2012) and WHO. The physiography and geological setting of the district is highly conducive for rich ground water resource. Industrialization, urbanization and inputs from modern agriculture result depletion of ground water quality. The main focus of this study is to evaluate groundwater quality through correlation coefficient and regression analysis. Most of the parameters are more or less correlated with each other. In some pockets of the district fluoride and iron are problems. In coastal track salinity is a problem. The ground water of the district is safe for domestic and irrigation use. Thus, proper awareness as well as policy decision is required to get contaminant free groundwater for a sustainable use.*

Key words: *Physicochemical parameters of water, Depletion of ground water, Sustainable water use.*

Introduction

Geochemistry of groundwater is an important factor determining its use for domestic, irrigation and industrial purposes. The degradation of groundwater quality generally occurs due to natural processes and other anthropogenic influences. The increased knowledge of geochemical processes that control groundwater chemical composition could lead to improve the understanding of hydrogeochemical systems in such areas. Such understandings like rock–water interactions, aquifer lithology, dissolution and residence time of groundwater may be helpful to improve the groundwater quality and management (Hem 1985). However, the over exploitation of groundwater for agricultural and other anthropogenic purposes were clubbed with frequent failure of monsoon and will lead to contamination of groundwater. A number of studies on groundwater quality with respect to drinking and irrigation purposes have been carried out in different parts of India (Sunitha et al. 2005; Subba Rao 2006; Giridharan et al. 2008; Das et al.2010; Krishna Kumar et al. 2011; Sarath Prasanth et al. 2012). The chief root of water supply for domestic requirements in town, rural and urban fringe of India is groundwater (Shroff et al., 2015). Das et al., 2020). More than

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Modernisation of Agricultural Activities Among the Farmers of Birbhum District, West Bengal: A Socio-Economic Perspective

Joyeeta Saha¹

Abstract : *Modernisation of agriculture is a process of transforming agriculture from traditional labour-based agriculture to technology-based agriculture. Agricultural modernisation relates to increase inputs in farming, like fertilizers, chemical pesticides, improved farm implements, mechanization, high yielding variety seeds, irrigation, storage, electricity supply to achieve more crop yield. The income earned by farmers from agricultural activities after paying for input costs and the wages for hired labour has seen low to high growth in different periods during the last three decades (Saxena and Rana, 2015). The modernisation among farmers is also influenced by economic, social, political and industrial factors apart from nearness to towns and cities. It is determined by the methods and techniques adopted by the farmers and application of the modern inputs. The present paper discusses the level of modernisation among farmers and its spatial variation in Birbhum District of West Bengal. Modernisation of agriculture is supposed to ensure productivity growth without imposing any threats to the natural environment in accordance with the principles of sustainable development. This study is based on primary data collection of 11 villages of Birbhum District.*

Key words: *Modernisation of agriculture, Farmer, Modern inputs, Sustainable development*

Introduction

Agriculture plays a pivotal role in the Indian economy. Although its contribution to gross domestic product (GDP) is now around one sixth, it provides employment to 56 per cent of the Indian workforce. The small and marginal farmers still today lack the technology knowhow at their farm lands. Small holdings play important role in raising agricultural development and poverty reduction (Dev, 2012). Agriculture sector in India is a primary source of livelihood for a majority of the population. Low and stagnant income in the sector remains a focal point of policy debate. The most prominent pathways to enhance farmers' income is the adoption of improved agricultural technologies. The knowhow of the technologies will boost their confidence and better marketing opportunities will make them independent where the intervention of middlemen will become absent. Agricultural marketing in India suffers from inefficiency, a disconnect between the prices received by producers and the prices paid by consumers, fragmented marketing channels, poor infrastructure

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Growth and Distribution of Towns: A Case Study of Nadia District, West Bengal, India

Sujan Mandal¹

Abstract : *The origin of towns is traced around 5000 B.C. when growth and development of different river valley civilizations led to the origin of towns. Similarly, Nadia has a glorious history of it. Nabadwip is the earliest known town of the district which was built in the medieval period of Indian history. Santipur, Krishnanagar, Ranaghat, Birnagar were also built up before Independence of India. Kalyani and Gayespur are the newly built-up towns only in the 20th century. Most of the towns of Nadia district are established and developed on the bank of river Ganga, Jalangi and Churni. Other small towns have developed near to the main towns. This paper aims to determine the distribution pattern of municipal towns and the relationship between concentration of census towns and municipal towns. All data has been collected from government sources. To assess the distribution pattern of the municipal towns of Nadia district Nearest Neighbour Analysis [NNA] method is used. This study reveals the more random than clustered type distribution pattern of municipal towns and tremendous growth of census town along the municipal town of Nadia district. Therefore, it will be helpful to government and district authorities for proper planning and development of the district.*

Key words: *Connectivity, Development, Distribution pattern, Urban concentration.*

Introduction

A settlement is an organised colony of human beings in which they live or work. Settlements change the natural environment by the cultural elements. In the beginning these settlements hold simple forms but with the growth of civilization and technological enhancement their size and complexity become greater. The term urban usually applied to a spatial or areal unit having certain specific characteristics which distinguish it from a rural unit. An urban unit may take the form of a town or city or metropolis (Chaudhuri, 2001). The origin of urban centres or town has been traced in 5000 B.C. when the growth and development of several river valley civilizations in the world led to the origin of towns at favourable locations as permanent human settlements (Mandal, 2000). In India the earliest urban developments were found in the Indus valley and in the adjoining parts of Rajasthan, Punjab and to some extent in the western Uttar Pradesh (Ramachandran, 1997). At present India is an over populated developing country of the world and is gradually growing up. Tremendously increasing population is the major problem for the development of the country.

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Living With Grey Tones in Grey Zones of Prayagraj: An Analytical Study of Slum Dwellers of Kydganj and Gaughat Area

Ajin Ray and Amna Farooqui

Abstract : *Urban attractions mean better opportunities, be it employment, education or health facilities. But, due to rapid and unplanned urbanization, we find grey areas in cities called 'slum'. In these areas, we find concentrated poverty, inadequate housing and very limited access to the basic services. The living conditions in slum represent the worst of urban plight. Slum dwellers face serious challenges in their survival efforts. In this paper, an effort has been made to focus on their survival techniques without any base. This paper also tries to highlight on their living condition, and problems faced by them and sincerely tries to provide solution so that, government, NGOs and social workers may initiate and work on their betterment and remove the grey tones of the city.*

Key words: *Grey Zones, Grey Tones, Urban Plight, Alienation, Insecurity.*

Introduction

Human beings desire social security, but almost everywhere there exists a lot of insecurity. The concern for social-well-being of man has found an increasing echo in 21st century. It is a condition in which the needs and wants of a given population are satisfied. But the question of social security is not that easy.

Personal security is the goal and personal insecurity is, by and large, the existing fact experienced by the people living in the grey-zones i.e., slums. The social conditions of slum-dwellers are:

- Poverty
- Unemployment
- Alienation
- Inadequate education
- Unhygienic living condition, etc.

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Effect of Social Determinants and Occupational Susceptibility on the Employment and Livelihood Conditions of the Auto Rickshaw Service Providers of Agartala City, Tripura

Debasish Debbarma and Saptarshi Mitra

Abstract : *The issue of unemployment has become a serious and complicated problem that presents enormous obstacles for people as well as the country's economy. India's difficulty creating jobs and providing work opportunities has wide-ranging effects due to its large and diverse population. In such conditions, informal service in the field of transportation plays a crucial role in not only creating job opportunities but also providing commutation services to daily passengers. This Para-transit mode of transport is identified as the auto rickshaw transport service. Despite their role, they face different occupational susceptibilities. The present research work aims to analyse the social composition of the auto rickshaw service providers and find out the economic condition under which they earn sustainable wages and run their daily livelihood. For this purpose, field enquiries were conducted on the random sample survey. The study highlighted various other factors that influence the physical and emotional well-being of auto rickshaw drivers, showing that the work environment and stress directly affect their livelihood, occupation, and health.*

Key words: *Occupational health, Livelihood, Service Provider, Occupational hazard*

Introduction

Unemployment is a key issue and a grave crisis that in some countries, may explode and undermine the social fabric very badly. The International Labour Organisation estimates that more than 280 million people worldwide are either unemployed or working at a job that does not pay even a subsistence wage. Many eminent economists opine that the problem of unemployment cannot be solved only by creating job opportunities. At the present level of economic crisis, it cannot be ignored that there is no other alternative way than self-employment. Due to the declining trend of employment, the ray of hope of providing jobs to hundreds and thousands is, therefore, seen with only self-dependent jobs. Under these circumstances, to arrest the rate of increasing unemployment, Auto Rickshaw driving became one of the self-employment plans aiming at providing jobs to plenty of unemployed individuals.

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Family Related Issues and Decision Making Pattern of the Rural Women in Haora District: Some Observations

Sutapa Mukherjee (Pal)¹

Abstract : *Family is very important for examining the status of women in a society. Traditionally a woman's sphere of operation is the family where she can involve herself and plays most of her roles as mother, as wife and sometimes as a breadwinner and in the decision making process in various household matters. Women are traditionally less involved in decision making at all levels. This paper is an attempt to highlight how much freedom of mobility, freedom of expression, freedom of control over resources and decision making power the rural women are enjoying in the study area. The Relationship between education and these family related issues is analyzed clearly. These indicators have a great significance in influencing the quality of life of the rural women and their status in the society.*

Key words: *Family, Freedom of mobility, Freedom of expression, Decision making pattern*

Introduction

The family can be recognized as social groups whose members live in a common residence, work for economic cooperation and do biological reproduction. Sociologists and anthropologists define it in terms of generations living together under the same roof. Family can also be defined on the basis of the types of relations and saving the income together, Criterion of land holdings have also been mentioned as a basis for family. Technically the family is defined as a group of persons united by the ties of marriage, blood or adoption constituting a single household, interacting with each other in their respective social positions of husbands and wife, mother and father, son and daughter, brother and sister, who share a common culture (Jehangir, 1991, 98).

According to Maciver family is a group defined by a sex relationship which is sufficiently precise and enduring to provide for the procreation and upbringing of children (Sachdeva, 1999, 285).

Family is very important for examining the status of women in a society. Family structure differs from one society to another, from one community to another. Rural–urban differences are also found even within the same country. In every society classification of family is possible in terms of the functions they perform, types of kinship relations and number of generations living

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Determinants of Household Decision Making Capacity of Women *Beedi* Workers: A Case Study of Tufanganj Subdivision of Koch Bihar District, West Bengal

Sangita Karmakar¹ and Ranjan Roy²

Abstract : *The ability of women to make decisions including their own health care, major household purchases, and family visits is an important component of their empowerment. But in developing and underdeveloped countries, the participation of women in any household decision is still fairly low. Particularly in marginalized societies, women's decision-making is restricted by patriarchal ideology and is determined by various socio-economic factors. Thus, the study examines the factors associated with household decision making capacity of women beedi workers in Tufanganj Subdivision of Koch Bihar district. Beedi workers are the most vulnerable people in society who hardly find their way of living by rolling beedi. The study is mainly based on primary data. 150 women beedi workers from different villages of Tufanganj Block - I have been selected for the study. Binary logistic regression was conducted to determine the factors associated with household decision making capacity of the respondents. The findings indicate that the decision making capacity of women beedi workers is associated with higher age, higher literacy rate and higher level of income. Hindu women have more probability of making decisions than non -Hindu women. Additionally, literacy status of the household head, family size, gender equitable attitude in family, and good relationship with family members lead to greater decision making power of women. Result also reveals that women who are more exposed to mass media are likely to have greater chances to participate in household decisions.*

Key words: *Decision making, Beedi worker, Socio-economic factors, Logistic regression.*

Introduction

Various studies show the fact that women significantly contribute to the development and growth of any country. However, their involvement in decision making is still low in many developing and undeveloped nations, largely because of cultural conservatism and infamous acts committed by their families and society as a whole (Pandey et al., 2021). Making a decision is considered as the most well-established indicator of women empowerment (Richardson,2018). But women have consistently been denied the freedom to make their own decisions in their lives due to societal conventions (Kabeer,1997). In order to comprehend women's position in a society, it

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The Wooden Arts and Crafts in Natungram: A Sustainable Indigenous Practice of West Bengal

Sibnath Sarkar¹

Abstract : *Handicrafts or folk-art bear witness to the cultural heritage of any country. In agriculture-oriented countries like India, handicrafts are not only significant from a cultural or social point of view, but also very crucial from an economic perspective. India is a country of art and artists. It has a huge legacy in craftwork and the craft tradition established around religious belief, local needs. Among the Indian states, West Bengal is well known for its signature and marvellous craft items and holds a significant position in all Indian handicraft items. It is a unique expression and representation of the culture, tradition, indigenous knowledge, sustainability and heritage of the land, crafting of wood is one of them. The present study has been conducted among the artisan group in Natungram which is a small village of Purba Burdwan district in West Bengal. Some qualitative research techniques have been applied for the findings on this art and craft. The findings reveal that there is a gendered division of labour and that it is a family based labour intensive work.*

Key words: *Wooden doll, Craft, Heritage, West Bengal*

Introduction

Indigenous knowledge is considered as the social capital of the poor. It is their main asset to invest in the struggle for survival, to produce food, to provide shelter and to achieve control on their own lives. Handicrafts are unique expressions and representations of a culture, tradition, indigenous knowledge, sustainability and heritage of any country. Handicrafts are an important component for any community and it adds to the household income and cultural identification of a community but also contributes to the revenues in terms of export. The handicraft sector includes a vast number of people residing in the rural and urban areas employing around seven million people. It also serves as a means of preserving cultural and artisan value (Grobar, 2017). Handicraft is known as ‘craftwork’ or ‘craft’ and is genetically the term that includes different ethnic and traditional items made and designed entirely by hands or by very simple tools (Sarkar, 2021). This sector of economic activity has been a sustainable livelihood opportunity for many communities as it is related to the traditions and culture followed by people of a particular area and community. The evolution of handicrafts, unlike other forms and age-old handicrafts traditions, have still lasted because of the inborn ability of the artisans to adapt and react to their changing

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Dyeing arts of India: A study on the traditional craft form of printing wood blocks of Pethapur, Gujarat

Anwasha Haldar¹ and Anish Bhattacharyya²

Abstract : Block printing is a traditional and artistic method of textile design that involves stamping fabric with intricately carved wooden blocks. The renowned Saudagiri Trade of the late 19th-mid 20th century has made Pethapur a Printing Block manufacturing hub. This craft involves the meticulous hand-carving of wooden blocks to create intricate designs. The process includes preparing the wood, tracing the design, engraving and dipping for seasoning the blocks which makes it ready to be printed on cloth with colours. Pethapur is one of the few existing centres globally practicing this art and among the three clusters in India upholds the cultural richness and designs through Indian history. With the rising mechanization, handmade blocks for printing is dying out with only 4 households practicing this at present. This paper tries to highlight the importance of the craft and how it can be revived.

Key words: Traditional handicrafts, GI tag, Wood engraving, Textile printing

Introduction

Traditional handicrafts have gained global recognition, with increasing demand for unique, handmade products (Barrett, 2018). Block printing in India is also widely known as “woodblock printing”, “woodcut printing” or “hand block printing”, and is a traditional and elaborate art form that uses hand-carved wooden blocks. It is a labour-intensive craft that relies on the ‘relief’ of its blocks to transfer design which when stamped in ink or dye is pressed along the length of the fabric to create its patterns. In order to make the block, the design is drawn on paper and attached onto the wooden block which is then carved according to the design on top of it. This carved block is then used to print by using specially prepared dye baths. The printed design comes in a mirror-image of its carved pattern. Traditional Pethapur block patterns were exclusively intended for export fabrics and the patterns were inspired from the medieval architecture of Sarkhej and Patan in Gujarat. The craftsmen have a collection of over 2 lakh designs where some are traditional while others are customized specifications given by designers. The craftsmen divide them into categories based on their origins like ‘Ajrakh’, ‘Bagru’, ‘Sanganer’, ‘Saudagiri’, etc. This article elaborates on the status block engraving art of Petapur town, near Kalol and

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