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PHARMACOGNOSTIC STUDY AND PHYTOCHEMICAL INVESTIGATION OF *ANDROGRAPHIS PANICULATA* USED BY LOCAL HEALERS IN DEVGAD REGION#

Vijay kumar Kunure¹, Vinayak Naik² and Ravindra Jadhav³

Abstract

The present communication deals with Pharmacognostical studies included macroscopic, microscopy, physicochemical and phytochemical investigation on whole plant of *Andrographis paniculata*. The collected plants were washed properly and dried under shade. Macroscopic study was done by observing parameter like colour, odour and taste by necked eyes. Microscopic study was done with fresh plant materials by taking transverse section of leaves and stem part and observing under microscope. Phytochemical investigation revealed the presence of various phytoconstituents in each extracts. It shows the presence of carbohydrates glycosides and saponins.

Keywords: *Andrographis paniculata*, Pharmacognosy, Acanthaceae

#Research Article

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COMPARATIVE MICROSCOPICAL AND PHYSICOCHEMICAL INVESTIGATION OF TRADITIONAL PLANTS OF *Canscorea* SPECIES

Ravindra P. Jadhav^{1#}, Vinayak Naik² and Vijaykumar Kunure³

Abstract

The present paper deals with comparative Pharmacognosy and physicochemical investigation of two species of *Canscorea* used by traditional healers in Vengurla region. The entire plant of both species is used by vaidus to cure and control viral and malarial fever. The fresh plants were collected and dried under shade and used for macroscopy and Microscopy study as well as physicochemical studies. Raw materials and herbal extracts were investigated for phytoconstituents. Both species were bitter in taste. Glycosides, Steroids, Terpenoids and Anthroquone were present in *Canscorea species*.


Keywords: *Canscorea diffusa*, *Canscorea perfoliata*, Microscopy, Gentiniaceae

#Short Communication

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IMPLEMENTATION OF ELECTRONIC NOSE TO DETECT LPG LEAKAGE

By

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ABSTRACT

The application of smart electronic instruments to detect leakage of inflammable or poisonous gases in the environment has significant importance in agricultural, industrial, smart home, and domestic applications. Detecting LPG through an early warning system at home, hotels, restaurants, and LPG warehouses can prevent fire accidents and save lives and avoid economic losses. Recent developments in digital electronics technology are more reliable in designing smart electronic systems to sense gas, and measure its concentration numerically. Using the AVR Atmega16 microcontroller on-chip tools, an electric nose design has been developed to detect LPG leakage. For present system, LPG sensor Figaro 813 and ferrite based sensor interfaced with on-chip ADC of AVR microcontroller has been used. It has a high level of agreement with the actual values and can detect the presence of LPG due to a leakage. In this paper, the results of both sensors are interpreted. The device is primarily intended to assist and enhance the security of smart kitchens.

Keywords: LPG Sensor, Ferrite Sensor, AVR Microcontroller, Electronic Nose, Embedded Technology.

INTRODUCTION

Precision instrumentation is playing an important role in the design of electronic instruments. The advanced features in microcontrollers aid in improving the precision and insight of the designed electronic device. Liquid petroleum gas (LPG) is important in both the industrial and domestic sectors, and its leakage may cause irreversible damage and hence the detection of LPG leak is crucial.

Researchers are increasingly utilizing the advanced features in microcontroller to design sophisticated electronic instrumentation for a variety of applications. (Patil & Ladgaonkar, 2013; Patil & Pawar, 2020; Pawar et al., 2017, 2020b). An embedded device is a good choice for designing such a sophisticated instrument for specialised applications (Pawar et al., 2020a, 2021). Embedded

systems are well-known for their wide range of applications in the consumer, manufacturing, and agricultural sectors, as well as in instruments for measuring and controlling physical and chemical parameters.

For detecting gas leakage, an electronic device with commendable silent features is needed. The device precisely monitors the remote location where gases are used or stored, ensuring worker safety and preventing damage. The Internet of Things (IoT) or wireless sensor network is one of the best solutions to acquire data from a remote location without the need for a human interface (Pawar et al., 2013, 2014). We all know that LPG is a highly flammable, expensive, and hazardous gas. It does, however, play a significant role in industry, automobiles, and domestic applications.

LPG is a costly fuel used for automobile application in recent years (Patil et al., 2019b, 2020a). To avoid potential hazards, on-chip resources of AVR microcontroller hardware and required software are designed and implemented for LPG leakage monitoring. This paper



This paper has objectives related to SDGs



discusses the design methodology and implementation of the embedded system to monitor gas leakage.

1. Hardware

The current work is focused on the design of a smart electronic nose for detecting LPG leakage. The electronic nose device is based on the AVR ATmega16 microcontroller, and the entire hardware component of the system is depicted in Figure 1. The hardware includes an LPG sensor, signal conditioners, computing unit, display unit, alarm and indicator, and power supply unit, to meet the objectives of the design of the embedded system to sense LPG leakage (Patil et al., 2020b). In the present system, two sensors are used, a $Ni_{1-x}Zn_xFe_2O_4$ ferrite sensor that has been prepared in-house and a market-available sensor called Figaro 813 for LPG detection.

This device uses a $Ni_{1-x}Zn_xFe_2O_4$ ferrite based sensor that has been developed on a ceramic substrate. Nano ferrite material has been synthesised using the co-precipitation process, and its structural details were tested using standard characterization techniques such as X-ray, IR spectroscopy, and so on. The synthesis of the material and its electrical properties are discussed in detail (Ladgaonkar et al., 2013; Patil et al., 2016, 2017b, 2019a). The thin film sensor that has been prepared is used to detect gas. With the applied operating temperature, the sensor is a resistive

type sensor that reveals semiconducting behaviour. The operating temperature is the temperature at which the sensor responds to a specific gas. Figure 2 shows the sensor that has been prepared. The emf of LPG across the resistor is measured and used in the signal conditioning stage of the operation.

The data sheet for the Figaro 813 sensor considers and takes output through a resistor that is connected to the sensing terminal. The Figaro sensor and the ferrite sensor are both resistive type sensors that require a heater to operate at elevated temperatures. Furthermore, the gas-dependent output of the sensor is connected to the signal conditioning stage of the circuit wired around TLC 271 and the LPG-dependent emf is applied to the AVR ATmega16's on-chip ADC channels with 0 and 1 as a computing unit (Ladgaonkar & Patil, 2011). The emf from the ferrite-based gas sensor has been connected to channel 0, but the emf from the Figaro 813 has been connected to channel 1 of the AVR microcontroller. The LCD monitor, alarm, and indicator sections are wired at the output section to give visual display to the user. The sensors detect LPG leakage in the environment and apply a concentration-dependent emf to TLC, which is then sent to AVR. The data is processed by the AVR, which displays a message on the LCD indicating that there is LPG leak and that the alarm is

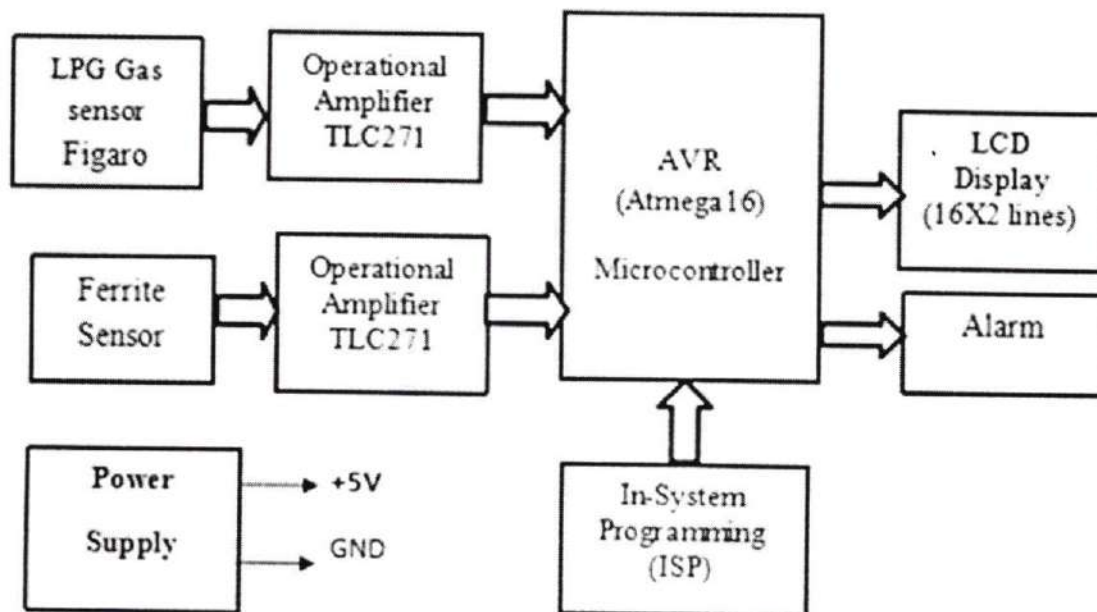


Figure 1. Block Diagram of the System

Development of Wireless Sensor Node for Automization in Restaurant Services

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Abstract: To emphasize modernization in restaurant and hotel management, the electronics and information and communication technologies are significantly developed. Recently in restaurant and hotel management services encompasses many process to be atomized, out of which the catering and food servicing has prime importance. Considering this fact into account, the zigbee technology based wireless sensor network is designed to atomize the catering and food system, different WSN nodes have been designed using AVR Atmega 16 and established on each table. Each node is associated with touch screen note pad wherein the detailed menu card is electronically mode available. The WSN nodes are wirelessly connected to the control room or counter. The customer can place the order with the code numbers provided. The order coming from each table WSN node is processed centrally and conveyed to the kitchen for preparation and service with corresponding table code. This system helps to realize not only atomisation but also user's friendly and reduces the time and man power.

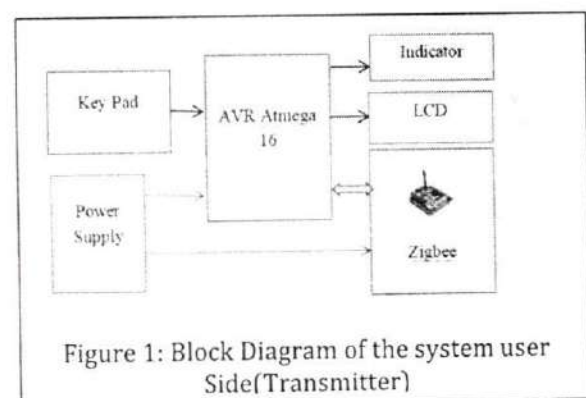
Keywords: WSN node, Zigbee, Restaurant Services, AVR Atmega.

1. Introduction:

Nowadays, we all suffering a big disease in the world called as COVID-19. The coronavirus disease is an infection disease mainly transmitted through droplets generated when infected person sneezes, coughs or exhales. The solution is to avoid infection keep safe distance, clean your hand. Therefore, many researchers and designers are interested to develop smart and automatic instruments for sanitization, distance alarming, provide wireless or touch less services[1]. Considering this fact it is proposed to develop a smart wireless sensor network for automation in restaurant services. The development of the computer communication is the rapid development of microelectronics technology and due to great reliability and preciseness in data processing, the field of Wireless Sensor Network (WSN) is becoming more pervasive[2]. On

deployment of wireless sensor network the field such as, agriculture, medical, chemical, defense, security environmental monitoring, traffic monitoring, food processing and preservation, automobiles, home automation, consumer and domestic appliances etc could be significantly modernized [3-4]. The Wireless Sensor Network combines input output devices, sensors, computing and communication into a single tiny device. These wireless sensor network senses the physical environment with the help of sensor or some manually added the information using keypad and takes the suitable control action based on its observations and accordingly performs the operations. Because of these ubiquitous features WSN technology is proved to be effective in designing of automation in traditional hotel services system. Moreover, traditional restaurant management system usually used to take customers orders by written on a paper, which needs a person to go near customer table and show menu card. So it may be time consuming to reach the order kitchen person after placing the order or some time mistake to write or listening order. Therefore, wireless sensor network is suitable solution to send the order proper person without mistake. The customer send his own order self to available wsn node on table. It is also found that many wireless network devices are available in the market to establish wireless sensor network [5-6]. The devices such as Bluetooth, Zigbee, WiFi module etc. However, for garden or large area restaurant or hotel Zigbee is suitable solution to develop network. Therefore, considering the facts of embedded technology [7-10], AVR Atmega 16 based smart WSN node design for restaurant services and presented in this paper.

2. Hardware Design:



Lithostratigraphy of Lava Flows at Waghjai Hill, Kolhapur District, Maharashtra

Abhijit J Patil¹, Yogita A. Patil^{2*}, H.S. Patode³

Abstract

The study area is covered by Deccan Volcanic Flood Basalts. The basalt is present in the form of lava flows, formed by fissure type of eruption. The basaltic flows have large areal extent. Flows are mostly horizontal and form flat topped hills with step like terraces are produced by differential weathering and erosion. The study area Waghjai Hill is situated in Kumbhi River Basin. The altitude ranges from 540 to 827 meters. The total thickness of Waghjai Hill lava flows is 287 meters. The lava flow mapping has been carried out in the study area and various flows are marked. There are seven lava flows in Waghjai Hill area. Each flow is composed of several subunits. The subunits are made up of vesicular and amygdaloidal basalt, compact basalt, and jointed basalt, red bole and volcanic breccia. Spheroidal weathering is observed. The volcanic breccia is formed at the top of the lava flows at some places. The patches of red bole mark the boundary of the successive lava flows at many places. In the study area, the commonly observed feature of the flows is spheroidal weathering. The general trend of the flows is horizontal.

Keywords: 'aa', amygdaloidal basalt, compact basalt, jointed basalt, lava flows, vesicular, Waghjai Hill

INTRODUCTION

The study area is mainly composed of basaltic lava flows. The DVP is one of the largest volcanic provinces in the world. The term 'Deccan Trap' was first used by W.H. Sykes (1833) [1]. In India, volcanic rock formation occurred in late Cretaceous to early Eocene period which is known as Deccan Traps or DVP. The eruption of lava proceeded from fissures and cracks in the surface of earth, from which highly liquid lava comes out intermittently, till a thickness of some thousand feet of horizontal sheet of basalt of igneous origin had resulted. Deccan Volcanic Province (DVP) has been studied by various workers with the help of geo-chemistry, photo geology, stratigraphy, palaeo-magnetism along with the field observation [2-4].

The flows are also categorized as compound when made of several smaller units and simple when

uniform over a large area and made of one single unit. Generally, the simple flows show aa lavas characters whereas the compound flows show features of pahoehoe lava [5-8]. The Deccan Trap basalts have been classified into three groups as – the Upper Traps, Middle Traps and Lower Traps with infratrappeans at the base [5, 8-11].

Study Area

Kumbhi River originates near Jetane village. (Taluka-Gaganbawada) at latitude 16° 28' 20.77" N to 16° 44' 0.35" N and longitude 73° 07' 13.74" E to 74° 49' 31.91" E in Survey of India (SOI) toposheet numbers 47H/14, 15 and 47L/2 on the scale 1:50000. It covers an area of about 354.86

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square kilometer in Kolhapur district of Maharashtra. The Waghjai Hill is situated in the vicinity of the study area.

METHODOLOGY

Geographical location of the various sites has been determined by a Global Positioning Systems (GPS) at an accuracy of $\leq \pm 3$ m horizontal. Lava flow mapping has been carried out in the hills of the area. These hills are situated in front of each other in the vicinity of the study area. The basalt samples have been collected randomly from various lava flows present in the area. The lava flow marking was conducted during the field work at Waghjai Hill.

Lithostratigraphy of study area: It is represented in Table 1 and described later.

Description of Lava Flows

Various flows present in the Waghjai area are further divided into several units as shown in Table 1. In the first flow there are two subunits which are composed of compact basalt with fractures and joints and upper one is of red bole and/or brecciated material. The second flow has three subunits. The lower one is composed of weathered jointed basalt, the middle one is of compact basalt with fractures and the upper one is composed of vesicular and amygdaloidal basalt with volcanic breccia. Third flow possesses three subunits; the lower one has compact massive basalt, middle one is made up of amygdaloidal basalt and at some places of vesicular basalt, the upper unit is made up of red bole and/or volcanic breccia.

The fourth flow is made up of two subunits. Lower one has compact massive basalt in it and the upper one is composed of red bole and/or volcanic breccia. The fifth flow has three subunits. They contain jointed basalt, weathered basalt showing spheroidal weathering and red bole and/or volcanic breccia, respectively. The sixth flow is made up of three subunits having compact basalt, zeolitic or amygdaloidal basalt and red bole and/or brecciated material, respectively. The seventh flow has only one subunit which is composed of hard and compact basalt with vesicles and voids.

Table 1. Lithostratigraphy of Waghjai Hill [12].

Flow No.	Total units	No. of subunits	Altitude of units	Average thickness of units (in m)	Characters of unit
W-VII	1	1	807 to 827	20	Hard and compact basalt with vesicles and voids
W-VI	3	3	806 to 807	1	Red bole and/or brecciated material
		2	790 to 806	16	Zeolitic or amygdaloidal basalt
		1	741 to 790	49	Compact basalt with less joints
W-V	3	3	740 to 741	1	Red bole and/or brecciated material
		2	732 to 740	8	Weathered basalt with spheroidal weathering
		1	705 to 732	27	Compact Basalt with joints
W-IV	2	2	703 to 705	2	Red bole and/or brecciated material
		1	655 to 703	48	Compact basalt (fine grained) with less joints
W-III	3	3	654 to 655	1	Red bole and/or brecciated material
		2	639 to 654	15	Amygdaloidal basalt with vesicular structure at some place
		1	619 to 639	20	Compact basalt (fine grained) with less joints
W-II	3	3	614 to 619	5	Vesicular and amygdaloidal basalt with brecciated material
		2	607 to 614	7	Compact basalt with joints/fractures
		1	594 to 607	13	Weathered basalt with joints
W-I	2	2	592 to 594	2	Red bole and/or brecciated material
		1	540 (In river bottom) to 592	52	Compact basalt with joints and fractures

Lithostratigraphy of Lava Flows at Tumjai Hill, Kolhapur District, Maharashtra, India.

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Abstract-

Deccan Traps are made up of basaltic lava flows of Upper Cretaceous to Lower Eocene age. These flows have been formed by fissure type of volcanoes. They form a part of plateau basalts of the Peninsular India. The flows are of 'aa' type.

The study area Tumjai Hill falls in Kumbhi River Basin. The altitude ranges from 539 meters to 889 meters. The total thickness of Tumjai Hill lava flows is 350 meters. The lava flow mapping has been carried out in the study area and various flows are marked. There are seven lava flows in Tumjai Hill area. Each flow is composed of several sub units. The sub units are made up of jointed basalt, compact basalt, vesicular and amygdaloidal basalt, red bole and volcanic breccia. Rosette structure and spheroidal weathering are also seen. Columnar joints are present in the upper part of the hill.

The volcanic breccia is formed at the top of the lava flows at some places. In which the angular rock fragments are mingled with lava. The patches of red bole mark the boundary of the successive lava flows at many places. The compact basalt is generally devoid of vesicles. In the study area the compact columnar jointing is found restricted to only some parts of the lava flows. In the study area the commonly observed feature of the flows is spheroidal weathering. The general trend of the flows is horizontal.

Key words - Lava flows, 'aa', Tumjai Hill, Columnar joints, jointed basalt, compact basalt, vesicular, amygdaloidal basalt, spheroidal weathering

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I. Introduction

The study area is mainly composed of basaltic lava flows. In general, the flows have large areal extent. Flows are mostly horizontal and form flat topped hills with step like terraces produced by differential weathering and erosion. The lava flows in the study area are mostly of 'aa' type.^{1,2,4,7}

This shows irregular piles or blocks of lava. The flows are also categorized as compound when made of several smaller units and simple when uniform over a large area and made of one single unit. Generally, the simple flows show aa lavas characters whereas the compound flows show features of pahoehoe lava.^{5,6,8} The Deccan Trap basalts have been classified into 3 groups as – the Upper Traps, Middle Traps and Lower Traps with infratrappeans at the base.^{9,10,11}. Beane et. al.³ suggested further classification of Deccan basalts.

Table 1- Geochemical Stratigraphy (Beane et. al. 1986)³

Group	Subgroup	Formation
Deccan Basalt	Wai	Mahabaleshwar
		Ambenali
		Poladpur
	Lonavala	Bhushe
		Khandala
		Bhimashankar
	Kalasubai	Thakurwadi-Upper Middle Lower

Lithostratigraphy of Lava Flows at Tumjai Hill, Kolhapur District, Maharashtra, India

		Neral
		Igatpuri
		Jawhar

Study Area -

The study area is situated at latitude 16° 28' 20.77"N to 16° 44' 0.35" N and longitude 73° 07' 13.74" E to 74° 49' 31.91" E in Survey of India (SOI) toposheet numbers 47H/14, 15 and 47L/2 on the scale 1:50000. It covers an area of about 354.86 Square kilometer in Kolhapur district of Maharashtra. The Tumjai Hill is situated in the vicinity of the study area.

II. Methodology

Geographical location of the various sites has been determined by a Global Positioning Systems (GPS) at an accuracy of ± 3 m horizontal. Lava flow mapping has been carried out in the Tumjai hill of the area. The basalt samples have been collected randomly from various lava flows present in the area. The lava flow marking has conducted during the field work at Tumjai Hill.

Lithostratigraphy of study area-

Table No.2- Lithostratigraphy of Tumjai Hill

Flow No.	Total units	No of subunits	Altitude of units.	Thickness of units (in mts)	Characters of unit
T-VII	2	2	870 to 889	19	Hard compact basalt with columnar structure
		1	810 to 870	60	Hard compact basalt with vesicles and voids
T-VI	3	3	808 to 810	2	Red bole and/or brecciated material
		2	802 to 808	6	Zeolitic or amagdaloidal basalt
		1	741 to 802	61	Compact basalt with less joints
T-V	3	3	740 to 741	1	Red bole and/or brecciated material
		2	738 to 740	2	Weathered basalt with spheroidal weathering
		1	710 to 738	28	Compact basalt with joints
T-IV	2	2	709 to 710	1	Red bole and/or brecciated material
		1	645 to 709	64	Compact basalt (fine grained) with less joints
T-III	3	3	644 to 645	1	Red bole and/or brecciated material
		2	638 to 644	6	Amygdaloidal basalt with vesicular structure
		1	616 to 638	22	Compact basalt (fine grained) with less joints
T-II	3	3	610 to 616	6	Vesicular and amygdaloidal basalt with brecciated material
		2	607 to 610	3	Compact basalt with joints have rosette structure
		1	586 to 607	21	Weathered basalt with joints
T-I	3	3	585 to 586	1	Red bole and/or brecciated material
		2	550 to 585	35	Weathered basalt with spheroidal weathering
		1	550 to 539	11	Compact basalt showing more joints /fractures

Geochemical Study of Groundwater for Drinking Purpose from Kasari Basin, Kolhapur, M.S.

Geochemical Assessment of Groundwater Samples for Drinking Purpose from Kasari River Basin, Kolhapur District, Maharashtra.

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Abstract-

Water scarcity has been a grave problem recently. Proper management and distribution of water have become indispensable to tackle this problem. River basin is a watershed and its management is essential to ensure the quantity and quality of its water. Study area has been underlined by Deccan Basalt lava flows. dug well and bore well samples from different parts of the Kasari River Basin have been collected and different physicochemical parameters have been analyzed to assess drinking quality of groundwater. The analysis of 42 water samples from Kasari river basin was carried for 14 parameters viz., pH, EC, TDS, Cl, TH, Ca, Mg, Na, K, CO₃, NO₃, HCO₃, Cl, and SO₄ for both seasons pre and post monsoon of the year 2018. All samples have values of different parameters within permissible limit and are fit for drinking purpose.

Key words- Water, Watershed, drinking quality, groundwater, permissible limit, Deccan Basalt

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I. Introduction

For drinking as well as irrigation purpose the quality assessment of water is a prerequisite. Various diseases spread through the polluted water. Even irrigation done by poor quality of water; results in improper seed germination and retardation of crop affecting the yield.

Also, the misuse of water and its unequal distribution are main hurdles in water management. As about 70% of Indian water resources and a growing number of its water reserves have been contaminated by biological, organic and inorganic pollutants. Analysis and study of various physicochemical parameters is essential from point of view of water quality for drinking as well as irrigation purpose. Understanding the hydrochemistry of water is vital for its optimal usage for drinking, irrigation, domestic or irrigation purpose. [4,5,11,12]

STUDY AREA-

The study area is Kasari River Basin. Kasari is one of the main tributaries of Panchganga River. Kasari River originates near Gajapur Village (Taluka-Shahuwadi) at Latitude 16° 39' 51'' to 16° 55' 13'' N and Longitude 73° 42' 51'' to 74° 42' 51'' E. The main stream is wide and receives water from a triangular area lying between watersheds of Vishalgadh in the North and Waghjai in the South. The river receives important Southern tributary called Mangari near Bhogaon village.

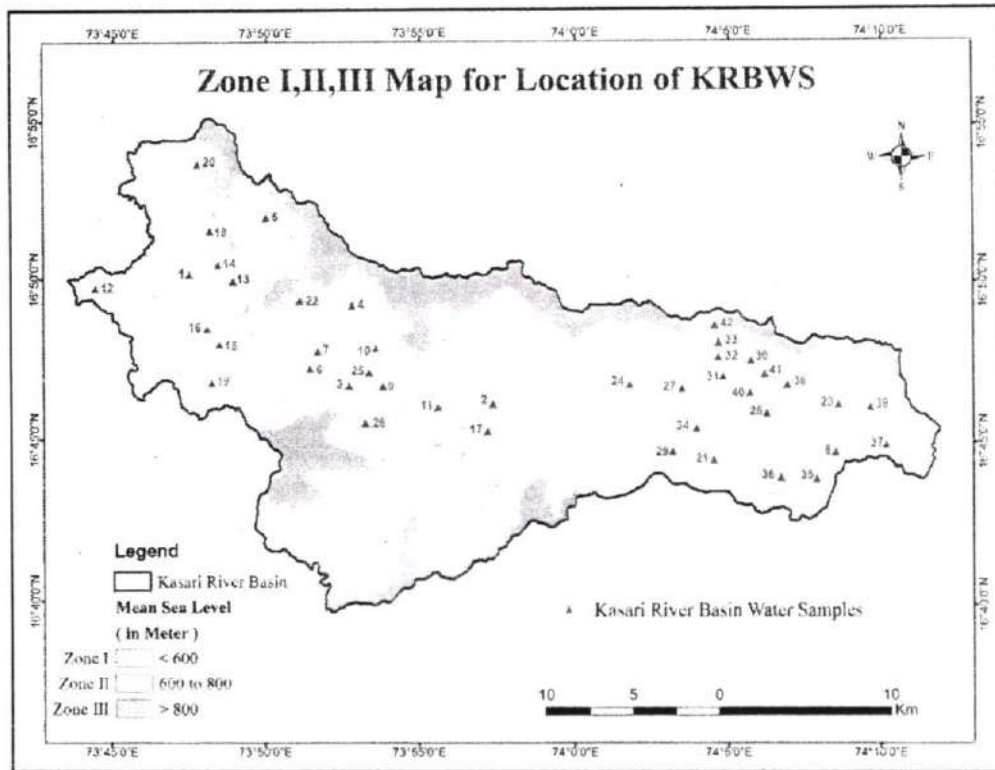


Fig. .1 Kasari River Basin Water Samples (KRBWS 1 to 42) Location Map with Zone I, Zone II and Zone III

In the above map the sampling locations are shown according to the height of the locations from mean sea level. The area is divided into three categories as area <600 msl. (Zone I), area from 600- 800 msl. (Zone II) and area > 800msl. (Zone III). Most of the locations fall under the category I i.e., <600msl. Few samples fall in second category i.e., from 600-800 msl. and very few samples belong to category III i.e., >800msl.

PHYSICO-CHEMICAL PARAMETERS-

The analysis of water samples from Kasari river basin was carried for 14 parameters viz., pH, EC, TDS, TH, Ca, Mg, Na, K, CO₃, NO₃, HCO₃, Cl, SO₄ and F.

I. pH

The pH of water is significant in geochemical equilibrium or solubility calculations. (Hem-1991). Most groundwater samples have pH range of 6.0 to 8.5 [3].

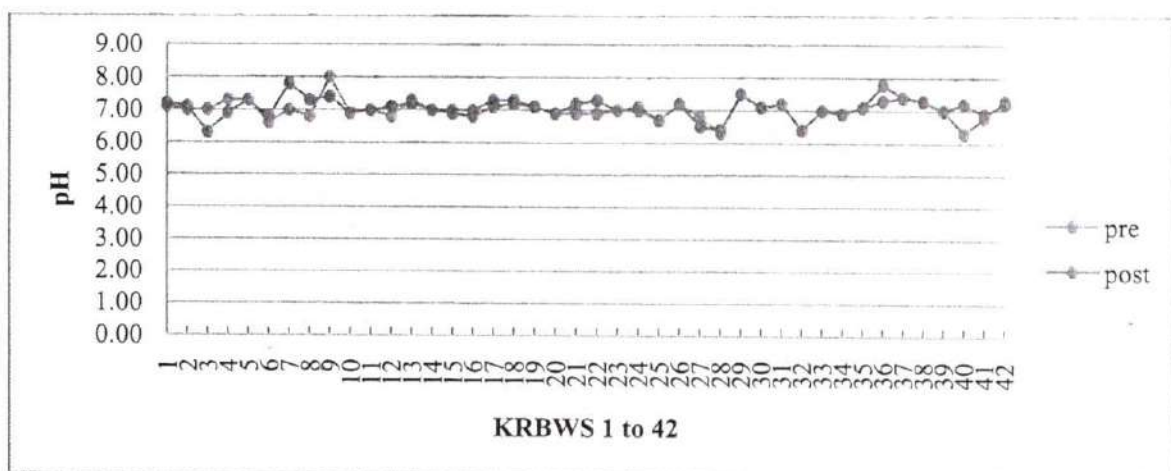


Fig 2- pH values for pre monsoon and post monsoon season 2018

Natural Resources Reflected in Amitav Ghosh's 'The Hungry Tide'

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Abstract:

We see that literature and nature have been inseparable since time immemorial. Many writers and poets have combined nature and literature in their writings. Nature is a very beautiful gift from God. Nature consists of air, water, trees etc. Natural, Physical or material world or universe has a broader meaning. From the creative inventions of the writer's, he has very lovingly presented the love of nature, the attraction of nature. The different fraternal states in nature are neatly written by writers & poets along with the study of individual life. This research paper explores how nature reflected in Amitav Ghosh's 'The Hungry Tide'

Keywords : beautiful of nature, concern for ecology, fraternal states, writer's attention, approach to nature.

Introduction:

Amitav Ghosh was born in Calcutta and grew up in India, Bangladesh and Sri Lanka. He studied in Delhi, Oxford and Alexandria and is the author of 'The Circle of Reason', 'The Shadow Lines', 'In An Antique Land', 'Dancing in Cambodia', 'The Calcutta Chromosome', 'The Glass Palace', 'The Hungry Tide', and 'The Ibis Trilogy', consisting of 'Sea of Poppies', 'River of Smoke' and 'Flood of Fire'. His most recent book, 'The Great Derangement: Climate Change and the Unthinkable', a work of non-fiction, appeared in 2016. The novel, 'The Hungry Tide' is an adventure and love for nature. Here the main perspective of the study is, how the people behave and react in relation to nature and aspects of nature? Indian villages notably at the fringes of the jungles were highly dependent on the resources provided by the forest for their livelihood. It is rightly quoted by Amitav Ghosh, "Bon Bibi granted me enough honey to fill the two bottles." (P.24) This novel cleared up the eyes of two educated men who go for the journey to the tide country. A businessman, Kanai Dutt visits his aunt Nilima for the package of uncle's last days that turn round Kusum, her son Fokir, who became victims by removing from the island of Morichjhapi. The protagonist, Piya visits for the purpose of finding a rare species of Dolphin, as she works as a Marine Biologist. Piya decides to seek help from Kanai, who has already invited her to Lucibari. Nilima also offers to help Piya by allotting the guesthouse for Piya's stay during her time of research. In the meeting of Nirmal, Kusum and Nilima, they get whole information about refugees of Morichjhapi & various causes of great distress. Nilima says, "Making us build it was probably the most important thing (Nirmal) did in his whole life. You can see the proof of that today. But if you'd told him that, he'd have laughed. He'd have said, 'It's just social service - not revolution.'" (P.320) Human have both a symbiotic relationship with nature. Piya experiences the man's relationship with the nature as well as inescapable dangers. She is able to observe the freshwater dolphins. Piya and Kanai make deliberate division to conserve people and environment in Sunderbans with commitment by relocating themselves to the place. Fokir, a forest guide always has a contact with hunters and woodcutters. He also guides Piya and Kanai through the waterways. Fokir and Moyna know the dangers of the forest. As Ghosh quotes: "Mosquitoes were the least of the creatures this net was intended to exclude; its absence; would have been an invitation for snakes and scorpions." (P.73) Kanai comes to an understanding of how unsure the tide is in Sunderbans after he interacts with Fokir's wife Moyna. Meeting held in the hospital gave him a perspective, as thorough out the meeting. Moyna was keen about sending their son Tutul to school. She has deep objection towards her son to attend school in the near future. But for these women the imagining of early widowhood was not a wasted effort: the hazards of life in the tide country were so great; so many perished in their youth, men especially, that almost without exception the fate that they had prepared themselves for did indeed befall them. 'The Hungry Tide' always talks about the dispute among man and nature with regards to the Sunderbans in India and Bangladesh. Kanai decides to leave along with Piya because the place where they visit is very dangerous. Every week tiger kills the people. They move towards the Garjontola pool in order to begin the research. Nature acts as a driving force in between the characters to hinder their communication. Though Fokir kills animals for living, he plays an important role in conserving them. Nature's exhaustion is instructed through the character of Kanai. Nalimia being the strongest character proves to reinforce that human beings are part of nature and she resources to insist on saving animals and explains the danger of it. When the action of the novel begins, Nirmal has passed away and passed on a notebook of his final reflections to his nephew, Kanai. His search for identity consists in his crossing the social, cultural borders. The massive storm brings Fokir's death and Piya takes the moral responsibility to look after his wife and child. In this novel, we came across the conflict in between man and nature primarily when people

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The Socio Economic Status Of The Farmers In Panahala Tehsil Of Kolhapur District

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Abstract :

Socioeconomic status (SES) is an economic and sociological combined total measure of a person's work experience and of an individual's or family's economic and social position in relation to others. When analyzing a family's SES, the household income, earners' education, and occupation are examined, as well as combined income, whereas for an individual's SES only their own attributes are assessed. However, SES is more commonly used to depict an economic difference in society as a whole.

Socioeconomic status is typically broken into three levels (high, middle, and low) to describe the three places a family or an individual may fall into. When placing a family or individual into one of these categories, any or all of the three variables (income, education, and occupation) can be assessed.

Introduction:

Education in higher socioeconomic families is typically stressed as much more important, both within the household as well as the local community. In poorer areas, where food, shelter and safety are priority, education can take a backseat. Youth audiences are particularly at risk for many health and social problems in the United States, such as unwanted pregnancies, drug abuse, and obesity.

Additionally, low income and education have been shown to be strong predictors of a range of physical and mental health problems, including respiratory viruses, arthritis, coronary disease, and schizophrenia. These problems may be due to environmental conditions in their workplace, or, in the case of disabilities or mental illnesses, may be the entire cause of that person's social predicament to begin with.

Agriculture has a significant role in socio economic of india has second largest population in the word after china. The two third of the Indian population lives in rural area in this population mostly depend upon agriculture. Over 50 year since is independence, India has made immense progress towards food security. Indian population has tripled but food grain production has than quadrupled ; thus there has been substantial increase in available food – grain per capital . therefore there is need to give much more attention to agriculture sector in India .

Important factors:

Income:

Income refers to wages, salaries, profits, rents, and any flow of earnings received. Income can also come in the form of unemployment or worker's compensation, social security, pensions, interests or dividends, royalties, trusts, alimony, or other governmental, public, or family financial assistance. It can also come from monetary winnings, as from lotteries and other games or contests where money is awarded as a prize.

Income can be looked at in two terms, relative and absolute. Absolute income, as theorized by economist John Maynard Keynes, is the relationship in which as income increases, so will consumption, but not at the same rate.[7] Relative income dictates a person's or family's savings and consumption based on the family's income in relation to others. Income is a commonly used measure of SES because it is relatively easy to figure for most individuals.

‘ज्वार’ में व्यक्त नारी का आत्मसंघर्ष

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सारांश :

शोषण नारी जाति की नियति है। पुरुष प्रधान व्यवस्था में नारी सदैव पुरुष की अधीनस्थता एवं अत्याचार को सहने के लिए विवश है। हर समझौता या हार अपनी नियति मानकर पुरुष की दासता वह स्वीकार करती आ रही है। अशिक्षा, अज्ञान और दमन के युग से लेकर शिक्षा और जागरण के इस युग में आने के बाद भी वह शोषण के अधिन दिखाई देती है। शिक्षित एवं आत्मनिर्भर होते हुए भी घर और बाहर दोनों जगह वह अन्याय एवं अत्याचार का शिकार बनी है।

सुचक शब्द - दोहरा कार्यभार, उत्तरदायित्व, दासता, स्वतंत्र अस्तित्व, आत्मसंघर्ष।

प्रस्तावना :

भारतीय संस्कृति में नारी का स्थान सदैव पुरुष से उँचा एवं महत्त्वपूर्ण रहा है। नारी घर-परिवार का संचालन कुशलता से करती है। इसलिए उसको गृहलक्ष्मी की महत्ता प्रदान की गयी। लेकिन पितृसंतात्मक परिवार तथा पुरुष प्रधान सामाजिक व्यवस्था के चलते नारी का यह महत्त्व कम होता गया। पुरुष अधिपत्य के प्रभाव में रहने के कारण परिवार तथा समाज में नारी का स्थान निम्न एवं हीन होने लगा। नारी सदैव पुरुषों की अधीनस्थता एवं अत्याचार को सहने के लिए विवश होने लगी। हर समझौता या हार अपनी नियति मानकर वह पुरुष की दासता स्वीकार करती आ रही थी। परंतु कालांतर में शिक्षा के प्रचार-प्रसार और नारी मुक्ति आंदोलन के फलस्वरूप स्त्री में सामाजिक जागरूकता बढ़ने लगी। वह परिवार के सीमित, एवं संकुचित दायरे से निकलकर समाज, सृष्टि एवं मानव जीवन का ज्ञान प्राप्त कर अपने व्यक्तित्व का विकास स्वयं करने लगी। डॉ. हेमेंद्रकुमार पानेरी के मतानुसार, “परंपरागत गृहस्थ एवं पतिव्रत के परिवेश में कुंठित नारी उच्चशिक्षा और नारी स्वातंत्र्य के प्रभाव में स्वच्छंद जीवन जीने की ओर अग्रसर हुई। परंपरागत अबला ने परिवर्तन के परिवेश में सबला बनकर पुरुष के समक्ष अपने स्वतंत्र अस्तित्व की घोषणा की।”^१ परंतु इसके लिए उसको आजीवन संघर्ष करना पड़ रहा है। हिंदी के महिला उपन्यासकारों ने नारी के इस संघर्षमय जीवन को प्रमुख प्रतिपाद्य मानकर अपनी रचनाओं का सृजन किया है। उपन्यासकार मधु भादुड़ी के ‘ज्वार’ उपन्यास में चित्रित नारी के संघर्षमय जीवन के विविध आयाम प्रस्तुत शोधालेख में समेटने का प्रयास किया है।

हिंदी की सुपरिचित लेखिका मधु भादुड़ी का ‘ज्वार’ उपन्यास नारी के आत्मसंघर्ष को अधोरेखित करता है। प्रस्तुत उपन्यास में सुषमा, निशा, लाजो आदि नारी पात्रों के द्वारा लेखिका आर्थिक रूप से आत्मनिर्भर नारी तथा नारी-स्वातंत्र्य के संदर्भ में कुछ बुनियादी सवाल उठाती है। दोहरा कार्यभार सफलता से निभानेवाली आज की नारी घर तथा कार्यालय दोनों जगह अन्याय एवं अत्याचार का शिकार क्यों हो रही है? ‘ज्वार’ उपन्यास की नायिका सुषमा पढी-लिखी, सुशिक्षित एवं नौकरीपेशा नारी है। वह दफ्तर के साथ-साथ घर की सारी जिम्मेदारियों को बखुबी निभाती है। उसका पति अशोक प्रोफेसर है। वह विचारों से बड़ा ही प्रगतिशील लगता है। परंतु व्यावहारिक रूप से वह परंपरागत पतियों से भिन्न नहीं है। अशोक अपने परिवार को बांध रखने के लिए लालायित नहीं है। उसे परिवार एक झमेला प्रतित होता है। सुषमा अपने सामर्थ्य से बढ़कर सहनशक्ति से अपनी

Effect of Herbicide Sweep Power (Glufosinate Ammonium) on Total Protein Content in Different Tissues of Freshwater Fish *Labeo rohita*

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ABSTRACT

Background: Sweep power (Glufosinate Ammonium) is the most commonly used herbicide in agriculture crop field to remove numerous weeds. Nowadays, the use of herbicides was increased in agriculture as well as an industrial area. Due to runoff water, these herbicides arrived at the nearest natural water bodies such as ponds, lakes, rivers etc. and adversely effect on the non-target organism.

Methods: In the present study, the freshwater fishes *Labeo rohita* were acclimatized in a glass aquarium and exposed to predetermined LC₀ and LC₅₀ concentration (0.01 ppm and 0.05 ppm respectively) of herbicide sweep power (Glufosinate Ammonium) for 96 hours. The amount of total protein content from different tissue of fishes from each experimental group was estimated.

Results: It was observed that the total protein content in gills, liver, muscle, and brain tissues were significantly decreased in LC₀ and LC₅₀ concentration group as compared to the control group.

Conclusion: From the present study, it confirms that the selected herbicide Sweep power (Glufosinate Ammonium), do interfere with normal metabolism and biochemical composition in freshwater fishes *L. rohita*.

Key-words: Glufosinate Ammonium, Herbicides, *Labeo rohita*, Protein, Sweep power

INTRODUCTION

Now-a-day numerous herbicides are used for the controlling of crop weeds. Most of the herbicides available in the market are synthetic, which is one of the major causes of water pollution. This is widely used to control weed and herbaceous pests. But, it greatly affects the quality and quantity of food production. These synthetic herbicides are directly used in the agricultural field and due to runoff water and soil erosion arrives at nearly water bodies such as a river, ponds, lakes, etc [1]. This can result in the accumulation of a large amount of herbicides in such water bodies. The normal aquatic flora and fauna including the fishes are greatly affected to change in the environment.

The fishes are directly exposed to the aquatic environment and accumulate various toxic compounds in organs. The toxic chemicals easily penetrate the fish's body by various routes such as direct contact, respiration by gills and food. The feeding of poisoned insect and other fishes is one of the secondary causes of exposure. They are adverse effects on the normal function, growth, behaviour and physiology of the fishes because of low degradability, high rate of accumulation inside the aquatic fauna and long term persistence [2].

Glufosinate ammonium is a highly effective herbicide used to control weeds in more than 100 crops in many countries worldwide. Farmers rely on Glufosinate-ammonium because it ensures a high degree of crop safety, as it only affects the parts of the plant where it is applied. Glufosinate ammonium was first brought to market in 1984. Today it is registered for use to control weeds in a variety of crops worldwide, including soybeans, corn, canola and cotton, which have been modified through genetic engineering to be tolerant to Glufosinate-ammonium.

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Linkages Between Sinuosity Index and Flood Sustainability: A Study of Morna River (Maharashtra), India

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Abstract

The morphological changes in the river channel over periods that occur due to the flood events, affected the sinuosity index of the river channel. The river characteristic like sinuosity also determines the intensity of flood in a channel. Recent flood losses have increased as a result of variability in rainfall; simultaneously such problems are coming up with sustainable development. The attempted research study has been carried out to evaluate and understand the river channel changes and bank stability of the Morna river in Maharashtra. The research work also identified the pattern/planform of the river. Morna river meets Warna river near the Mangle village. Most of the streams in the upper basin area are non-perennial. The occurrence of floods takes place due to seasonal rainfall. An index of Sinuosity was used to analyze variation in river courses, as well as identify stability and instability. Therefore, this may facilitate predicting probable riverbank erosion sites and also support sustainable flood management planning for these sites during forthcoming flood events. The sinuosity index of the Morna river ranges from 1.09 to 1.44. The sinuosity indexes for the Morna river and tributaries of its sub-basins/watersheds have been calculated using geospatial techniques. The disparities in sinuosity indexes of the Morna basin and sub-watersheds having a good correlation with slope of the river, fluvial processes, water discharge and hydraulic aspects of the river channel. Seasonal potential flood risk for the agricultural land may be found at the confluence of the Warna river and its tributary Morna river when it receives heavy rainfall in upstream.



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Keywords

Flood,
Meandering Channel;
River Confluence;
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Review Paper:

Impact of Heavy Metals in Riverine and Estuarine Environment: A review

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Abstract

The significance of Riverine and Estuarine environment on the earth surface is very considerable. The Riverine and Estuarine environments support the plant growth and are the habitats of animals. In the present study, an attempt has been made to review the impact of heavy metals in the riverine and estuarine environment. Besides natural disturbances to these environments, human induced interferences are more destructive in terms of degradation. Heavy metals present in environment are not toxic to a great extent as compared to human made compounds of heavy metals. Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Manganese (Mn), Mercury (Hg), Nickel (Ni) and Zinc (Zn) are some of the examples of heavy metals added into the environment by polluted water through various anthropogenic activities such as manufacturing industries, mining and agricultural industries.

Collective depositions of material, minerals, wastage and bedload are transported to river system and also accumulate in the estuarine ecosystems. Estuaries are the most important source of food and many economic activities for coastal population. High content of heavy metals into the estuaries causes harmful effects on marine biota and produces high risk to the human health through the sea food. This review discusses the sources of heavy metals, its impact on environment and their limits/standard in the Riverine and Estuarine environment.

Keywords: Heavy metals, River, Estuary, Contamination, Consequences.

Introduction

Heavy metal contamination in soil on a large scale is now a global threat. Heavy metal contamination has increased in recent years in many inland waters as well as estuarine ecosystems²³. Estuaries are most important to have enormous habitats like open water, reefs, sediments, sand and mud flats, sea grasses, salt marshes, mangroves associated with it. An estuary also supports various species of fish, marine plants and animals. The estuaries are also important for environment because they also filter pollutants like pesticides, herbicides and heavy metals present in the

flow. 2/3rd population of the earth is associated with coast and coastal activities in which estuaries play the most important role. Industries like fisheries and tourism are major income sources in coastal region and therefore it becomes more crucial to maintain this unique ecosystem.

Heavy metals concentration is found in the leaves of halophytes (plants near salt marshes) and results show that heavy metal accumulated more in the low level salt marshes (near sea water) than the high level salt marshes (away from sea water)¹⁴. Quick civilization and the continuing reclamation also increase the amount of Fe, Cu and Mn^{10,43} heavy metals in the surface water of the estuaries which affects the wetland vegetation¹⁰. E-waste burning adds the heavy metal to the soil and gets accumulated in nearby vegetation and through plants, it enters in the human and animals⁸. Oil exploitation activities near coastal region are increasing the heavy metal contamination in the estuaries and soil at the coast creates risk for the coastal ecosystem.^{17,43}

Heavy metals: Though these heavy metals are present in the nature from several years, but their toxicity is increased due to anthropogenic activities like mining, urbanisation, oil extraction and reclamation of sea. This is one of the major parts of air, water and soil pollutants. Health of humans and plants depend on the surrounding they live, so it is very important to study the direct and indirect effects on environment due to heavy metals. Heavy metals are actually a group of metals or metalloids having an atomic number greater than 22 and specific gravity greater than 5. Examples are copper (Cu), lead (Pb), nickel (Ni), cadmium (Cd), mercury (Hg), arsenic (As), zinc (Zn) and chromium (Cr).^{6,7,10,17}

There are essential elements in the heavy metal group for both plants and animals but some of them are toxic towards living organism. The proportion of the heavy metals must be balanced or else it will harmful in nature. As these metals are toxic, they dissolve in water and affect living organisms. Some of the effect of the heavy metal on human organs like kidneys, liver, lungs, hairs and skin may possibly cause severe damage and also affect high blood-pressure, cancer and many severe disease³⁷.

Although there are harmful effects of heavy metals, there are some positive effects of heavy metal to the environment, like plant having need of macro-nutrients (C, H, N, O₂, P, S, etc.) as well as micronutrients (B, Cl, Cu, Fe, Mn, Mo, Ni and Zn)

Impact of Saltwater Intrusion on the Agricultural Land of Coastal Tract: An Investigation Along Malvan Coast, Maharashtra

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Abstract:

It has observed that, Saltwater intrusion becomes a serious problem in the coastal areas of Maharashtra. Lateral movements of salt water from ocean by means of tidal inlets and estuarine channels are most prominent in these areas. At many sites the agricultural area is contaminated by saltwater and spread according to the ground slope. It also observed that excessive concentrations of salts in the soil are toxic for some crops. This salinity affects on the productivity and growth of agricultural crops. Local people in the study area needs a permanent solution to manage their agricultural lands and preventive methods to overcome the problem of salinity. An attempt has made to identify the salinity affected agricultural areas near the mangrove swamps of coastal Malvan of Maharashtra.

Keywords: Salinity, LULC, Estuary, Tidal inlet, Agricultural contamination.

Introduction:

In the attempted research study importance has been given to study the impact of salinity on the agricultural lands of the coastal villages/areas. When agricultural activity is concerned then, it needs good quality of soil i.e. fertile soil, good climatic conditions and availability of sufficient water. Lack of water for agricultural purpose, water with salinity resulting for the worst conditions in terms of crop productivity in the river basin area or region. Now-days increasing population and the utilization of basic needs exerts pressure on agriculture and natural resources. According to Foley et al. near about a billion people are constantly "malnourished" while the existing 'agricultural systems' are simultaneously with degrading land and water gets deteriorated (Foley et al. 2011). The study has attempted using GIS and Remote Sensing techniques. In the study area it has seen that saline water is entering towards the inland agricultural lands from the seaward side. The sea water is coming through the estuaries and tidal inlets and spread in the agricultural lands. The coastal resource comprises disparity ecosystems like mud flats, estuaries, mangroves, etc. Agricultural land is important natural resource in the area; that make available food products to the native population. In the coastal zone of of Sindhudurg district, most of the agricultural lands by the side of the banks of the estuaries or near the sea are converted to saline land also called as kharlands (Sapkale & Rathod, 2014). Central Soil Salinity Research Institute (CSSRI) is a research institute that carries interdisciplinary research on basic, strategic and applied researches on the reclamation and management of salt affected soils and poor quality water in agriculture. For coastal areas where water blockage is a frequent problem, shallow, medium deep and deep water depth tolerant rice varieties have been introduced (CSSRI, 2019).

Methodology :

The present research work aims to identify and estimate the saline land and land use land cover area in the study area. The study attempted to correlate such analysis to saline land and its impact on the area. The study area forms a part of agricultural sites of Chivla tidal inlet and kolamb estuary (fig. 1) of sindhudurg districts. (i) **Field work & field surveys:** It was decided to conduct detailed field survey to identify the salinity affected area in the study area. Therefore detailed field survey was carried out in the study area. (ii) **Land Use / Land Cover:** During the field surveys, saline area-characteristics in terms of vegetation, soil, rock structure, forest covered area, have been identified. (iii) **Remote Sensing and GIS Techniques :** Land use/land cover analysis were carried out using remote sensing and GIS Techniques. GIS Software Arc view, ERDAS IMAGINE 9.1 have used for the analysis of various characteristics of the affected sites. SRTM data was also used for the preparation of various maps. Land use and land cover classification through supervised classification methods by using LANDSAT, TM , Satellite image of study area were used.

Environmental Effect of Warna Dam in Context with River Shift and Salinity Problem **Jagdish B. Sapkale^{1*}, Balu L. Rathod², Nilesh K. Susware³, Pradeep S. Joshi⁴**

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Abstract:

The present study forms a part of Warna river basin, including Chandoli dam (Warna dam) and stretches of River channel in Maharashtra State of India. Warna River is a major tributary of the Krishna River, rises in Sahyadri ranges of Maharashtra. It flows with a straight south-east direction along the northern borders of Malkapur, Panhala, Alta and Shirol for a distance of about 129 km and meets river Krishna at Haripur of Sangli district. The attempted research work deals with the salinisation, water logging and other downstream environmental problems related to river characteristics, more or less influenced by the dam.

Keywords: Flood damage, River Shift, Salinity, River erosion, Water logging

Introduction:

In India, the population has increased day by day. Available resources have been used by the people to fulfil the basic priorities. Frequently, the growing population in any region or of any country exerts pressure on the accessible natural resources. Most of the population depends on primary activities, secondary activities and tertiary activities. Among all of these, the agricultural activity is the dominant one. The agricultural system provides enormous benefits to the living population. This primary activity has increased the global per capita food supply, it helps to control over the hunger, also maintains the natural ecosystems in the balanced form (FAO, 2001; Tilman et.al, 2002). Lack of water for agricultural purpose, consequently reduces the agricultural productivity. Therefore, storage of water through dam, solves the water deficiency in any region. These dams provide more and sufficient benefits to the people, also impact on their economic and social well-being. Various experiences reflect that there are positive impact of dam and negative impact of dam also. Dams, by providing water for irrigation purposes reduces the flood problems, huge impounded water also used for power generation. These are the major positive effects of dam but dams are also responsible for environmental problems like, destruction of vegetation in the upstream of dam, variation in river channel morphology in the downstream of dam, salinisation and water logging problem due to over exploitation of water through irrigation are the negative impacts of dam. In context with the problems occurring indirectly due to the dam, an attempt has been made and discussed in this research work.

Methodology :

The present study deals with the assessment of river shift and the environmental problems occurs in the study area. Therefore the research work was based on the field visits and primary data collection. Shifts in river channel have studied during the field visits and measured using surveying instruments and GPS. Some sites were studied using google earth images of year 2003 and year 2014. Questionnaire survey has carried out in some villages of Warna river basin, the fieldwork was consisting of participant observation in order to carry out the problem study regarding water logging and salinity.

Shifts in Warna river channel and river bed configuration:

Some environmental problems occurs due to dam, may be directly or indirectly. An attempt have also been made to study the impact of dam and weirs on the morphological characteristics of Warna river channel, the results have been observed due to aggradation or degradation of channel. Aggradation and Degradation are the fluvial processes mostly associated with a river and its differentiating parameters. Aggradation and degradation are generally influenced by river discharge, sediment load, morphological characteristics of river channel and human interventions. If the river water is unable to transfer the bed load or the channel material then the same is deposited within the channel and channel height increases, aggradation occurs. This also leads to change the river morphology and hydraulic geometry. Degradation is another process which is responsible for the lowering of river bed and also shifting the channel banks. Fluvial deposition in terms of aggradation and its associated landforms, fluvial erosion i.e. degradation are the basic processes which are almost responsible for variation in channel cross sections and channel width adjustment. Therefore causes and influence of these processes is also discussed here.

In view of this, aggradational and degradational impact in channel has been studied because the channels are logical and efficient place to investigate the geomorphic effects of force, resistance, erosion, transportation and deposition. In Warna channel the flow of river water and the distribution of bed material have been regulated by Warna (Chandoli) dam (Sapkale, 2016).

Variability of Sand Spits at the Mouth of Estuaries: A Disastrous Impact Study of Phanase , Tambaldeg and Tondavali of Sindhudurg Coasts

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Abstract

Numerous coastal landforms have been found in the parts of west coast of Maharashtra. The depositional coastal land forms like sand bars, sand dune and sand spits are continuously varying coastal landforms in the region. These coastal landforms are changing their characteristics seasonally due to the coastal and fluvial processes and also changes due to the human intervention. An attempt has been made to assess the size and shapes of sandspits of Phanase, Tambaldeg, and Tondavali for the year 2003, 2011 and 2019.

The variations in the spits have also been evaluated periodically for the considered years. Every year the dimension of the sand spits, has changed at these sites. The data variation in the shape, size and aerial extent of the sand spit has been procured from the Remote Sensing Technique and Google Earth Satellite Images. Besides this, a field survey with the in situ observation of sand spits at primary stage was also conducted at the coastal area of Phanase, Tambaldeg and Tondavali.

Keywords: Coastal landform, Sand Spits, Sand bars, Satellite Images, Sea waves.

Introduction

Coastal landforms are formed due to equilibrium condition of erosional and depositional processes which are highly affected by the sea waves and tidal energy¹⁵. The formation process of sand spits and their altering uniqueness in terms of morphological change in shoreline landforms have been acknowledged by Johnson⁹ and Zenkovich¹⁸. It has been noted that west coast of Maharashtra comprised with coastal depositional features like beaches, sand dunes, sand bars and sand spits. In this areas sand spits are generally formed at the mouth of estuaries and tidal inlet.

Ganuzas - Monge et al⁶ have also studied the accumulation and formation of sand spits at the mouth of eastern Cantabrian estuaries⁶. A sand spit is a low leveled deposited sediment i.e. ridge type feature attached to land or beach at one end, with the other edge opening in estuary or sea water. The growth and variability of sand spits may be affected by artificial structures³.

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The estuarine mouth changes seasonally and depends on the geomorphological characteristics. The deposition of material, its shape and size vary due to their associated processes at the estuarine mouth with the contact of sea water. There is a strong relationship between coastal landforms, wind, sea waves and tidal currents⁶. During the low tide the sediment transport rate on the spit is higher than during the period of high tide, however sand spit level depends on bed topography and river stage¹⁶. Most of the population is intensely leaving along the coasts worldwide, many coastal landscape have been affected by the native people and natural disaster¹. Numerous natural hazard may result in another disastrous effect on the locals in multiple form¹⁴.

Therefore, the study about the high risk zones due to natural disaster is significantly a need for proper management. According to many research scholars, the post-disaster assessment helps to reduce the disastrous impact. The affected area may rehabilitate with the proper protective measures^{8,13,17}. Papathoma and Dominey-Howes¹² in their study have attempted a new tsunami vulnerability assessment method for the two coastal villages in their study area that helps for the proper distribution of resources and disaster management planning.

On the basis of published tsunami risk maps, the research scholars have assumed that tsunami flood risk has usually the natural calamities within the expected flood zone in their study area^{5,10}. But in their region they revealed that 'population and infrastructure within a given flood zone were not uniformly at risk' due to the predicted and potential risk zone, because of the in detail study about the flood prone areas^{11,12}.

As discussed earlier, coastal population is increasing rapidly in the coastal area and settlements are threatened by disastrous events like storms, cyclones and coastal floods. Therefore, such erosion prone affected areas should be continuously monitored for accurate information in terms of variability in the coastal landforms and migration of shoreline features. Such comprehensive analysis of shoreline movement has also been attempted by the U.S. Geological Survey in their region. Mapping and analysis results of shoreline change may help in the concrete management of the coastal features⁷.

The affected and erosion prone sites of sand spit should always be protected that are essential for the preservation of