SIDHO KANHO BIRSHA UNIVERSITY

Ability Enhancement Compulsory Courses (AECC)

ENVIRONMENTAL STUDIES

ACHHRURAM MEMORIAL COLLEGE, JHALDA, PURULIA

FOR HONOURS

SEMESTER – 1

2023

PROJECT WORK

ON

STUDY OF SIMPLE ECOSYSTEM: POND

NAME – Subrata Bagti

ROLL NUMBER – 101141-2210067

REGISTRATION NUMBER – 000067 of 2022-23

MARKS OBTAINED – (10)

SIGNATURE OF THE EXAMINER-

Study of Simple Ecosystems: Pond

❖ Introduction:

Ponds are small, yet complex ecosystems that support a diverse array of plants, animals, and microorganisms. They play critical roles in local biodiversity and ecosystem services, such as water filtration and habitat provision. However, ponds face numerous threats that can disrupt their delicate balance and functionality.

❖ Problems:

1. **Pollution:** Runoff from agriculture and urban areas introduces pollutants like pesticides and fertilizers.
2. **Habitat Degradation:** Human activities such as construction and landscaping can destroy or fragment pond habitats.
3. **Invasive Species:** Non-native plants and animals can outcompete native species and disrupt the ecosystem.
4. **Climate Change:** Altered precipitation patterns and temperature can affect pond water levels and species distributions.

❖ Objectives:

1. To assess the biodiversity of plant and animal species within the pond ecosystem.
2. To evaluate water quality parameters such as pH, dissolved oxygen, and nutrient levels.
3. To identify key ecological threats affecting the pond ecosystem.
4. To propose conservation and management strategies based on study findings.

❖ Method of Data Collection:

1. **Field Observations:** Conduct visual surveys to document plant species diversity and observe animal behavior.
2. **Water Sampling:** Collect water samples from different locations within the pond for laboratory analysis.
3. **Species Identification:** Use taxonomic keys and field guides to identify plant and animal species.
4. **Data Analysis:** Analyze biodiversity indices and water quality parameters using statistical methods.

❖ Discussion:

The study revealed a rich diversity of flora and fauna in the pond ecosystem, highlighting its ecological significance. Water quality analysis indicated moderate pH levels but elevated nutrient concentrations, potentially due to nearby agricultural activities. Threats such as pollution and invasive species were identified as major challenges to ecosystem health, necessitating immediate conservation actions.

❖ Suggestions:

1. **Pollution Control:** Implement measures to reduce agricultural runoff and manage urban pollutants.
2. **Habitat Restoration:** Restore and protect natural habitats surrounding the pond to enhance biodiversity.
3. **Invasive Species Management:** Develop strategies for monitoring and controlling invasive species to preserve native biodiversity.
4. **Community Engagement:** Educate local communities about the importance of pond ecosystems and involve them in conservation efforts.

❖ **Limitations of Study:**

1. **Sampling Bias:** Limited sampling locations and times may not fully capture seasonal or spatial variations.
2. **Resource Constraints:** Budget and time limitations may restrict the scope and depth of data collection.
3. **Interpretation Challenges:** Complex interactions within the ecosystem may require further research to fully understand.

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ON

STUDY OF SIMPLE ECOSYSTEM: POND

NAME – Ariana Rajak

ROLL NUMBER – 101151-220101

REGISTRATION NUMBER – 00164 of 2022-23

MARKS OBTAINED – (10)

SIGNATURE OF THE EXAMINER-

01 পুকুরের বাস্তুতন্ত্র পর্যালোচনা

Study of Pond Ecosystem

ভূমিকা (Introduction) :

অনুকূল পরিবেশের সাহায্যে পৃথিবীর যে স্থানে কোনো জীবগোষ্ঠী স্বাভাবিকভাবে বেঁচে থাকে, তাকে প্রাকৃতিক বাসভূমি বলে। পরিবেশের সঙ্গে প্রাকৃতিক পরিবেশের একটি গুরুত্বপূর্ণ সম্পর্ক আছে। Limnology নামক বিজ্ঞানে মিষ্টি জলের প্রাকৃতিক পরিবেশ নিয়ে আলোচনা করা হয়। আবদ্ধ জলের প্রাকৃতিক বাসভূমি বা লেনটিক হ্যাবিটেট-এর একটি সুন্দর উদাহরণ হল পুকুর। পুকুর হল নানাপ্রকার উদ্ভিদ ও প্রাণীর বাসস্থান, বিভিন্ন প্রকার অজীবজ এবং জীবজ উপাদান একে অপরের সঙ্গে বিক্রিয়া করে একটি বাস্তুতন্ত্র গঠন করে। পুকুরের বাস্তুতন্ত্র হল একটি স্বয়ংসম্পূর্ণ বাস্তুতন্ত্র। পুকুরে একটি সুনির্দিষ্ট খাদ্যশৃঙ্খল দেখা যায়। খাদ্যশৃঙ্খল অনুসারে এখানে তিন ধরনের জীব দেখা যায়। যথা—উৎপাদক, খাদক এবং বিয়োজক।

সমস্যা (Problems) :

গ্রামে পুকুরের গুরুত্ব অপরিসীম। কারণ পুকুরের জলে স্নান, কাপড় কাচা, বাসন মাজা ইত্যাদি গ্রামের লোকেরা সম্পন্ন করে। কিন্তু পুকুরের জলে গবাদিপশুর স্নান, আবর্জনা ফেলা এবং কাপড় কাচা সাবানের জল পুকুরের বাস্তুতন্ত্রকে নষ্ট করে দিচ্ছে, যা প্রকৃতির ভারসাম্যকে বিনষ্ট করছে। তাই পুকুরের বাস্তুতন্ত্র পর্যবেক্ষণ করা এবং রক্ষা করা খুবই গুরুত্বপূর্ণ।

উদ্দেশ্য (Objectives) :

1. ওই পুকুরে কী কী উদ্ভিদ ও প্রাণী থাকে তার নাম লিপিবদ্ধ করা।
2. উদ্ভিদের বাসস্থান লিপিবদ্ধ করা।
3. প্রাণীদের শ্বাস অঙ্গ, গমন অঙ্গ এবং খাদ্য লিপিবদ্ধ করা।
4. পুকুরের জল কোনোভাবে দূষিত হচ্ছে কি না তা নির্ণয় করা।
5. কীভাবে দূষণ প্রতিরোধ করা যায় তার উপায় নির্ণয় করা।

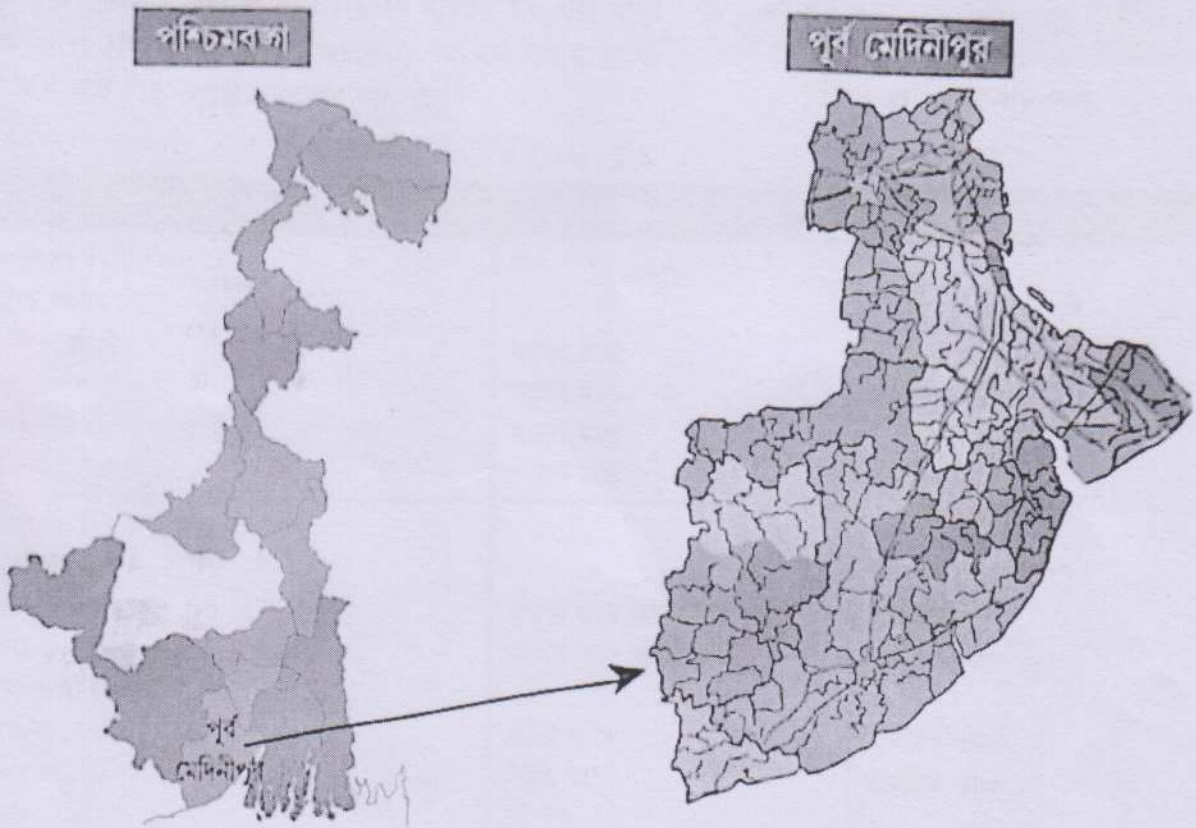
সার্ভে অঞ্চলের ভৌগোলিক অবস্থান (Location of Study Area) :

- পুকুরের নাম : বড় ভাঁঠ
- পুকুরের অবস্থান (গ্রাম বা পৌরসভার নাম) : দুর্গাপুর
- দূরত্ব (কলেজ থেকে ইশ্বর সম্ভাব্য দূরত্ব) : 2 কিলোমিটার
- পুকুরের অক্ষাংশ এবং দ্রাঘিমাংশ : —

তথ্যসংগ্রহের পদ্ধতি (Methods of Data Collection) :

▶ **প্রাইমারি তথ্যসংগ্রহ :** আমি ..... তারিখে ..... সময় নির্দিষ্ট পুকুরে পৌঁছে বিভিন্ন তথ্যসংগ্রহ করে নোটবুকে তুলে রাখলাম। ক্যামেরার সাহায্যে বিভিন্ন উদ্ভিদ ও প্রাণীর ছবি তুললাম। পুকুরের মাটি এবং জল সংগ্রহ করে কলেজে ফিরে এলাম। এরপর মাইক্রোস্কোপ এবং বিভিন্ন যন্ত্রপাতির সাহায্যে জল এবং মাটির বিশ্লেষণ করে বিভিন্ন তথ্যসংগ্রহ করলাম।

▶ **সেকেন্ডারি তথ্যসংগ্রহ :** বিভিন্ন বই ও পত্রিকা থেকে প্রাণী ও উদ্ভিদের বিভিন্ন তথ্যসংগ্রহ করেছি।



চিত্র 1.1 : পশ্চিমবঙ্গের ম্যাপ ও তার মধ্যে পূর্ব মেদিনীপুরের সার্ভে এলাকার ম্যাপ

ফলাফল (Results) :

• Table : 1 •

উদ্ভিদের নাম	বাসস্থান	বাস্তুতন্ত্রে অবস্থান
A. মাইক্রো :		
1. ফাইটোপ্ল্যাংকটন		
(a) ডায়াটম	জলের মধ্যে	উৎপাদক
B. ম্যাক্রো :		
1. সুসনি	জলের ধারে	উৎপাদক
2. কলমি	জলের ধারে	উৎপাদক
3. শালুক	গভীর জলে	উৎপাদক
4. কাঁকি	জলে ভাসমান	উৎপাদক

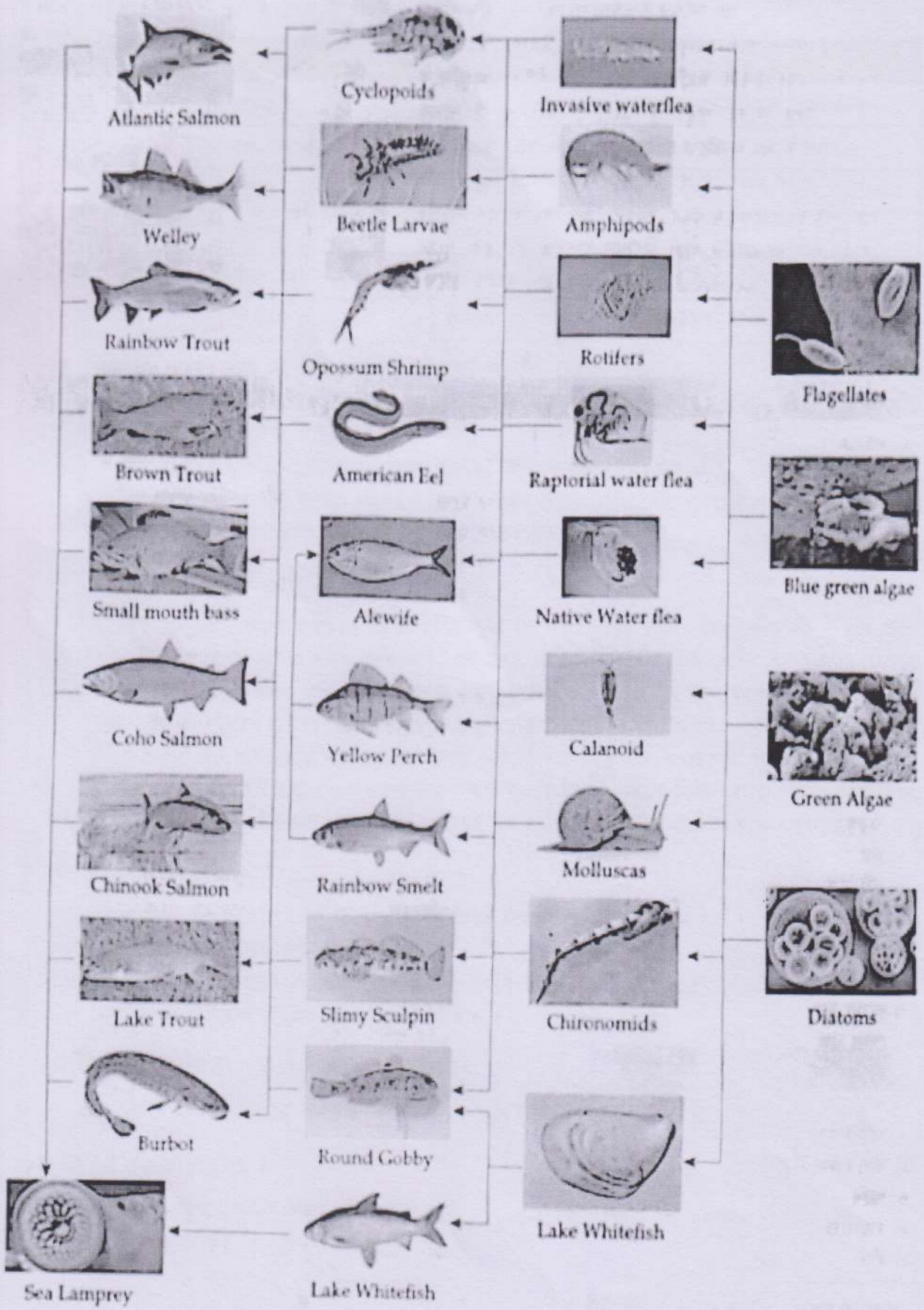
পুকুরের সবুজ উদ্ভিদ বিভিন্ন অজৈব উপাদান সংগ্রহ করে সৌরশক্তির সাহায্যে খাদ্য উৎপাদন করে। জলজ কীটপতঙ্গরা উৎপাদকের তৈরি খাদ্য ভক্ষণ করে এবং ছোটো ছোটো মাছেরা জলজ কীটপতঙ্গগুলিকে খাদ্য হিসেবে গ্রহণ করে। পুকুরের জলে 5 ধরনের উৎপাদক পেয়েছিলাম, যার মধ্যে একটিকে মাইক্রোস্কোপের সাহায্যে চিহ্নিত করেছিলাম। বাকিগুলি খালি চোখে দেখতে পেয়েছিলাম, এদের মধ্যে কিছু গাছ জলের ধারে বসবাস করে, আবার কিছু গাছ জলের গভীরে বসবাস করে। ডায়াটম মাছের খাদ্য হিসেবে ব্যবহৃত হয় এবং বড়ো গাছগুলি জলে DO (Dissolve Oxygen)-এর মান বজায় রাখে। তাছাড়া ওই গাছ কিছু জলজ পতঙ্গের বাসস্থান।

চিত্র 1.2 : জলাশয় পর্যবেক্ষণ

• Table : 2 •

প্রাণির নাম	বাসস্থান	খাদ্যশৃঙ্খলে অবস্থান
A. মাইক্রো :		
1. প্ল্যাঙ্কটন		
(a) ডাফনিয়া	জলের মধ্যে	প্রাথমিক খাদক
(b) সাইক্লপস	জলের মধ্যে	প্রাথমিক খাদক
(c) সাইপ্রিস	জলের মধ্যে	প্রাথমিক খাদক
(d) মডনা	জলের মধ্যে	প্রাথমিক খাদক
B. ম্যাক্রো :		
1. পোকামাকড়		
(a) জলের মাকড়সা	জলের ধারে গাছপালার মধ্যে	প্রাথমিক খাদক
(b) চিংড়ি	জলের তলে মাটির কাছে	প্রাথমিক খাদক
2. মোলাস্কা		
(a) শামুক	মাটির কাছে	প্রাথমিক খাদক
(b) ঝিনুক	মাটির মধ্যে	প্রাথমিক খাদক
3. মাছ		
(a) পুঁটি মাছ	জলের উপরিতলে	প্রাথমিক খাদক
(b) মৌরলা মাছ	জলের উপরিতলে	প্রাথমিক খাদক
(c) কাতলা মাছ	জলের উপরিতলে	প্রাথমিক খাদক
(d) রুই মাছ	জলের মধ্যতলে	প্রাথমিক খাদক
(e) মৃগেল মাছ	জলের নিম্নতলে	প্রাথমিক খাদক
(f) শোল মাছ	জলের ভেতর কাদার মধ্যে	দ্বিতীয় সারির খাদক
4. অ্যাম্ফিবিয়া		
(a) ব্যাং	জলের ধারে	তৃতীয় সারির খাদক
5. রেপ্টিলিয়া		
(a) সাপ (জলঢোঁড়া)	জলের ধারে	তৃতীয় সারির খাদক
6. পাখি		
(a) মাছরাঙা	পুকুরের পাড়ে—গাছের ডালে	তৃতীয় সারির খাদক
(b) হাঁস	পুকুরের জলে ভাসমান	তৃতীয় সারির খাদক

পুকুরের জলে 13টি প্রাথমিক খাদক, 1টি দ্বিতীয় সারির খাদক এবং 2টি তৃতীয় সারির খাদক বর্তমান। এদের বাসস্থান একই হলেও Niche আলাদা তাই এদের মধ্যে কোনো প্রতিযোগিতা দেখা যায়নি।



চিত্র 1.3: জলাশয়ের ইকোসিস্টেম

• Table : 3 •

প্রাণীর নাম	গমনাগম	খাদ্যাভ্যাস	খাদ্য
1. পুঁটি মাছ	পাখনা	ফুলকা	ফাইটোপ্ল্যাংকটন এবং জুপ্ল্যাংকটন
2. ঝিনুক	বক্ত উপাঙ্গ	ফুলকা	ফাইটোপ্ল্যাংকটন এবং শ্যাওলা
3. কোল মাছ	পাখনা	ফুলকা	ছোটো মাছ
4. ব্যাঙ	লিম্বপদ	ফুসফুস	কীটপতঙ্গ
5. মাছরাঙা	ডানা	ফুসফুস	ছোটো মাছ
6. হাঁস	লিম্বপদ	ফুসফুস	পোকা পুগলি

ওপরে টেবিল-এ দেখতে পাই যে বিভিন্ন প্রাণীর গমনাঙ্গ আলাদা, যেমন—কারও পাখনা, আবার কারও লিম্বপদ, আবার কারও বক্ত উপাঙ্গ। কোনো প্রাণীর শ্বাস অঙ্গ ফুসফুস আবার কারও ফুলকা, কেউ জুপ্ল্যাংকটন খায়, আবার কেউ কীটপতঙ্গ খায়।

সমীক্ষা নিয়ে দেখা গেল পাড়ার 10-12টি ঘরের লোক পুকুরের জলে কাপড় কাচে। আবার 5-6টি ঘরের লোক তাদের [illegible] পুকুরের জলে স্নান করায়। গ্রামের কয়েকজন লোক তাদের গাড়ি ধোয় পুকুরের পাড়ে, ফলে ডিজেল [illegible] জলের সঙ্গে পুকুরের জলে মিশে পুকুরের জল দূষিত করে।

আলোচনা (Discussion) :

পুকুরের বাস্তুতন্ত্র হল একটি আদর্শ বাস্তুতন্ত্র। এই বাস্তুতন্ত্রে সূর্যই হল সমস্ত শক্তির উৎস। উৎপাদকরা এই শক্তিকে গ্রহণ করে খাদ্য উৎপন্ন করে, যা প্রথম শ্রেণির খাদক গ্রহণ করে। এই প্রথম শ্রেণির খাদককে দ্বিতীয় শ্রেণির খাদক খাদ্য হিসেবে গ্রহণ করে। দ্বিতীয় শ্রেণির খাদক খাদ্য হিসেবে দ্বিতীয় শ্রেণির খাদককে খাদ্য হিসেবে গ্রহণ করে এবং একটি সুস্থির [illegible] যা পুকুরের বাস্তুতন্ত্রকে আদর্শ বাস্তুতন্ত্রে রূপান্তরিত করেছে। কিন্তু গ্রীষ্মকালে যখন পুকুরের জল কমে [illegible] কারণে জল দূষিত হয়ে পড়ে, যা ব্যবহারের অযোগ্য হয়ে পড়ে। এর ফলে যারা পুকুরের জলের ওপর [illegible] খুব কষ্ট হয়। তাই গ্রামের লোকেদের ভালো করে বুঝতে হবে পৃথিবীতে মিষ্টি জলের পরিমাণ ধীরে ধীরে [illegible] তাই এই জলকে সংরক্ষণ করা খুবই জরুরি এবং এই জল যাতে দূষিত না হয় সেদিকে লক্ষ রাখতে হবে।

পরামর্শ (Suggestion) :

[illegible] লোকদের বোঝাতে হবে পৃথিবী আজ জলসংকটের সামনে, তাই জল অপচয় করা যাবে না।

[illegible] পুকুরের জলে কোনো স্নান করানো যাবে না।

[illegible] গাড়ি ধোয়া জল যাতে না মেশে সেদিকে লক্ষ রাখতে হবে।

[illegible] জল ফেলার পরিমাণ ধীরে ধীরে কমাতে হবে।

কাজের সীমাবদ্ধতা (Limitation of Study) :

[illegible] মতো সেইভাবে পর্যবেক্ষণ করে উঠতে পারিনি।

তথ্যসূত্র (References) :

[illegible] শিক্ষা—উচ্চমাধ্যমিক শিক্ষা সংসদ

[illegible] শিক্ষা প্রোজেক্ট রিপোর্ট—এ ঘোষ

[illegible] বিদ্যা—এ পাল

[illegible] —এ চট্টোপাধ্যায়

[illegible] প্রকাশ—এম টি দাস ও এস সি সাহারা

SIDHO KANHO BIRSHA UNIVERSITY

Ability Enhancement Compulsory Courses (AECC)
ENVIRONMENTAL STUDIES

ACHHRURAM MEMORIAL COLLEGE, JHALDA, PURULIA

FOR HONOURS

SEMESTER – 1

2023

PROJECT WORK

ON

STUDY OF SIMPLE ECOSYSTEM: POND

NAME – Abinash Kumar

ROLL NUMBER – 101141-22\0001

REGISTRATION NUMBER – 000601 of 2022-23

MARKS OBTAINED – (10)

SIGNATURE OF THE EXAMINER-

Study of Simple Ecosystems: Pond

Introduction:

Ponds, small yet intricate ecosystems, harbor a rich diversity of life forms and play integral roles within the environment. This project seeks to explore and comprehend the components, interactions, and dynamics inherent to pond ecosystems, emphasizing their ecological significance and the imperative of conservation.

Objectives:

1. Identify the biotic and abiotic elements comprising a pond ecosystem.
2. Investigate the interactions and interdependencies among various organisms inhabiting the pond.
3. Analyze the flow of energy and the cycling of nutrients within the pond ecosystem.
4. Discuss the environmental importance of ponds and propose strategies for their preservation.

Components of a Pond Ecosystem:

- **Biotic Components:** Include phytoplankton, algae, aquatic plants, zooplankton, insects (e.g., dragonflies, mosquitoes), fish, amphibians, reptiles, and birds.
- **Abiotic Components:** Encompass water, sunlight, temperature, dissolved oxygen, pH levels, and nutrients such as nitrogen and phosphorus.

Interactions and Relationships:

- **Producer-Consumer Relationships:** Primary producers like phytoplankton and aquatic plants sustain a variety of consumers such as zooplankton, insects, and fish.
- **Predator-Prey Dynamics:** Predatory insects and fish play crucial roles in regulating populations by consuming smaller organisms.
- **Symbiotic Relationships:** Mutualistic interactions, such as those between algae and aquatic plants or certain insects and amphibians, contribute to ecosystem balance.

Energy Flow and Nutrient Cycling:

- **Energy Flow:** Initiated by sunlight, captured through photosynthesis by producers, and transferred through trophic levels from herbivores to predators.
- **Nutrient Cycling:** Involves decomposition of organic matter by bacteria and fungi, releasing nutrients back into the water to support plant growth and sustain the ecosystem.

Environmental Significance of Ponds:

- **Biodiversity Hotspots:** Support a diverse array of flora and fauna, including species that may be endangered or threatened.

- **Water Quality Enhancement:** Act as natural filters, enhancing water quality by trapping sediments and pollutants.
- **Recreational and Educational Value:** Provide habitats for recreation, study, and research, promoting environmental awareness and conservation efforts.

Conservation Measures:

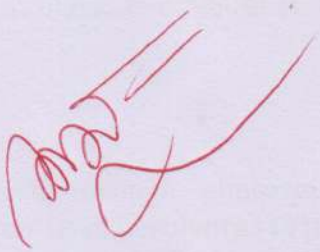
- **Habitat Preservation:** Safeguarding natural ponds from pollution and habitat degradation.
- **Restoration Initiatives:** Implementing ecosystem restoration practices to revive degraded ponds.
- **Community Engagement:** Educating local communities about pond importance and involving them in conservation endeavors.

Conclusion:

Ponds exemplify the intricate complexity and resilience of natural ecosystems, sustaining a delicate balance of life forms and ecological processes. By studying and conserving pond ecosystems, we contribute to environmental health and ensure sustainability for future generations.

Recommendations for Further Research:

- Conduct long-term monitoring of pond ecosystems to assess changes in biodiversity and water quality.
- Undertake comparative studies between natural and human-made ponds to comprehend ecosystem dynamics.
- Evaluate the impacts of climate change and human activities on pond ecosystems to inform conservation efforts effectively.



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FOR PROGRAMME

SEMESTER – 1

2023

PROJECT WORK

ON

POLLUTION ISSUES IN RURAL AREAS

NAME – Janmejoy Mahato

ROLL NUMBER – 101242 - 22300020

REGISTRATION NUMBER – 000100 of 2022-23

MARKS OBTAINED – (10)

SIGNATURE OF THE EXAMINER-

17 গ্রাম পরিবেশে দূষণজনিত সমস্যা

Pollution Issues in Rural Areas

ভূমিকা (Introduction) :

দূষণ কেবলমাত্র শিল্পাঞ্চল ও শহরতলি এলাকার মধ্যে সীমাবদ্ধ একথা ঠিক নয়। বর্তমানে গ্রামাঞ্চলেও এই দূষণের প্রাদুর্ভাব ক্রমশ বেড়ে চলেছে। কৃষিক্ষেত্র থেকে গৃহস্থালির বিভিন্ন কাজে ব্যবহৃত রাসায়নিক দ্রব্যাদির দ্বারা যেমন দূষণ ঘটছে ঠিক তেমনি ইট ও টালিভাটা থেকে নির্গত ধোঁয়া বায়ুকে ব্যাপকভাবে দূষিত করে তুলেছে। মানুষ থেকে শুরু করে গাছপালা, পশুপাখি, গৃহপালিত জীবজন্তু সকলেই এই দূষণের শিকার হচ্ছে।

এছাড়া বিভিন্ন প্রকার বায়ুদূষক সরাসরি বায়ুতে মিশে গিয়ে দূষণ বাড়াচ্ছে। এগুলি হল—ছাই, ধূলিকণা, ধোঁয়া, সালফার গুঁড়ো, কার্বন, মনোক্সাইড, বিভিন্ন ধাতু, পরাগরেণু ইত্যাদি। প্লাস্টিক, কাচের টুকরো, ছেড়া কাপড়, পয়ঃপ্রণালীর জল, প্রাণীর মলমূত্র, হাসপাতালের বর্জ্য, পেস্টিসাইড, আগাছানাশক ইত্যাদি দ্বারাও গ্রাম্য পরিবেশে দূষণমাত্রা বেড়েই চলেছে। প্রত্যক্ষ বা পরোক্ষভাবে মানুষের ব্যবহারের পর পরিত্যক্ত পদার্থের দ্বারা গ্রামের পরিবেশ নানাভাবে দূষিত হয়ে থাকে।

সমস্যা (Problems) :

আমরা জানি, গ্রাম্যপরিবেশ হল নির্মল ও দূষণমুক্ত পরিবেশ কিন্তু এই নির্মল গ্রাম্য পরিবেশ আজ এই দূষণের কঠিন প্রকোপের শিকার হয়েছে। যার ফলে ওই অঞ্চলের মানুষজন বিভিন্ন প্রকার মারাত্মক ব্যাধির শিকার হচ্ছে। প্রাণী ও উদ্ভিদের বিভিন্ন প্রজাতি হারিয়ে যেতে বসেছে।

উদ্দেশ্য (Objectives) :

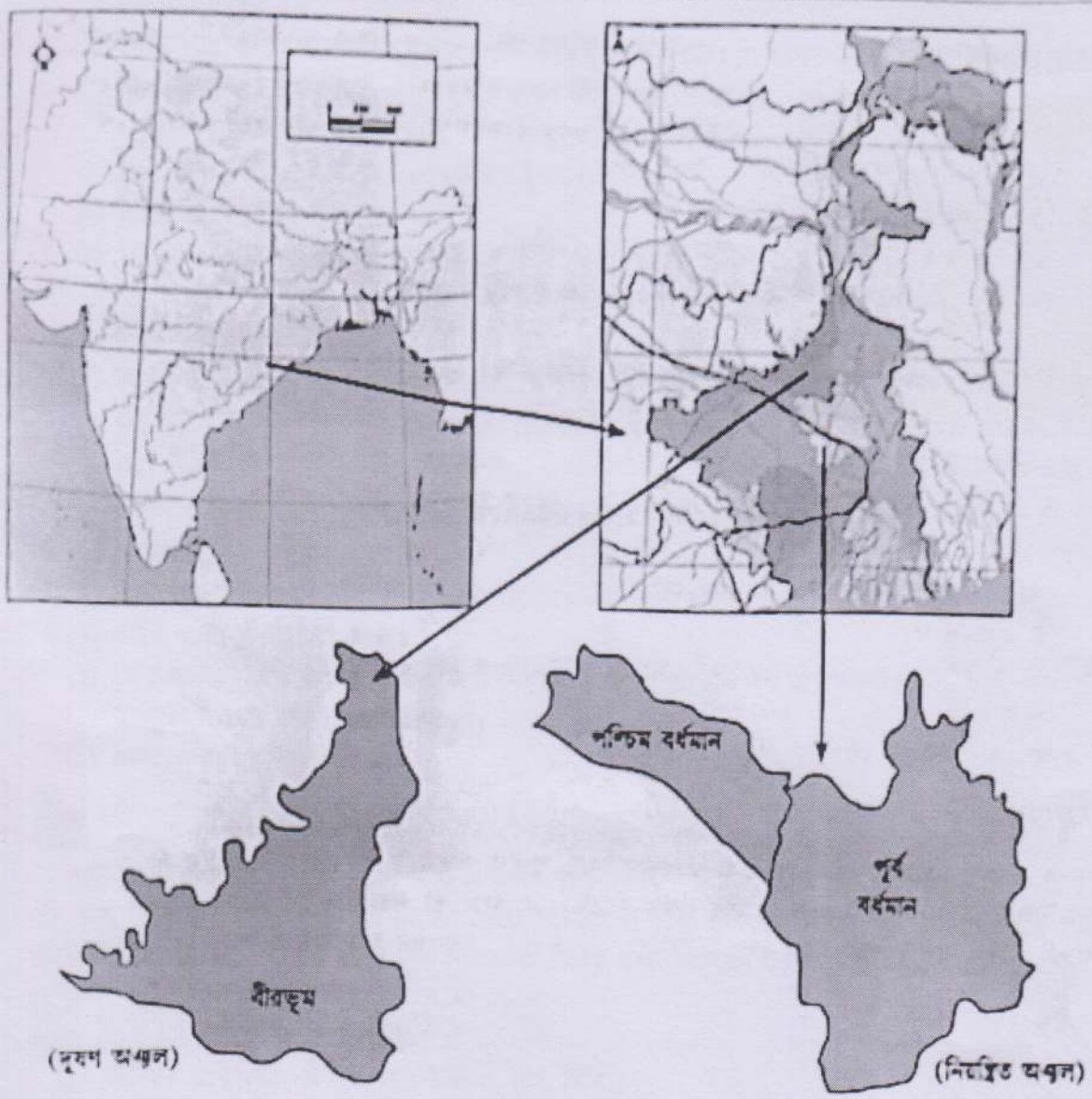
① সার্ভে অঞ্চলের মানুষজনের আক্রান্ত রোগের তালিকা প্রস্তুত করা।
② ওই অঞ্চলে অবস্থিত দূষণ সৃষ্টিকারী উৎসগুলির নাম লিপিবদ্ধ করা।
③ কীভাবে এই বিভিন্ন প্রকার দূষণ কমানো যাবে তার রূপরেখা তৈরি করা।

সার্ভে অঞ্চলের ভৌগোলিক পরিচিতি (Geographical Characters of Study Area) :

- **একটা নির্দিষ্ট গ্রামের লোকসংখ্যা :**
- **ওই গ্রামের আয়তন :**
- **ওই গ্রামের মানুষজনের শিক্ষার হার :**
- **ওই গ্রামের অক্ষাংশ ও দ্রাঘিমাংশ :**

তথ্য সংগ্রহের পদ্ধতি (Methods of Data Collection) :

- **প্রাইমারি তথ্যসংগ্রহ :** ওই সার্ভে অঞ্চলের বিভিন্ন মানুষজনকে প্রশ্নের মাধ্যমে বিভিন্ন তথ্যসংগ্রহ করেছি।
- **সেকেন্ডারি তথ্যসংগ্রহ :** বিভিন্ন পত্রিকা, বই এবং Internet থেকে তথ্যগুলি সংগ্রহ করেছি।



চিত্র 17.1 : ভারতবর্ষের ম্যাপ ও তার মধ্যে পশ্চিমবঙ্গের বীরভূম ও বর্ধমান জেলার গ্রাম্য পরিবেশের দূষণ সংক্রান্ত সার্ভে ম্যাপ

ফলাফল (Results) :

A. দূষণ উৎসের তালিকা (List of Source of Pollution) :

দূষণের উৎস	দূষণের প্রকৃতি
1. ইট ও টালিভাটা	1. বায়ুদূষণ
2. পেস্টিসাইড	2. জলদূষণ
3. ডিটারজেন্ট	3. জলদূষণ
4. গৃহস্থালির আবর্জনা	4. জলদূষণ ও মাটি দূষণ

B. ক্ষতিকারক প্রভাব (Harmful Effects) :

① **উড়ন্ত ছাই (Fly Ash) :** ইট ও টালিভাটা থেকে নির্গত ছাই পার্শ্ববর্তী জমি, সবজি খেত ও ঘরবাড়ির ওপরে পাতলা আস্তরণের সৃষ্টি করে, যা মানুষের শ্বাসকষ্ট, হাঁপানি ইত্যাদি রোগের সৃষ্টি করে।

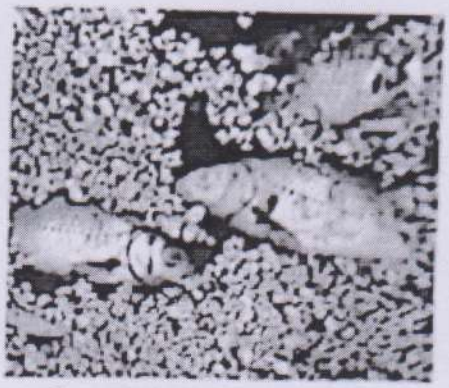
② **গৃহস্থালির উনুন এবং ইট ও টালিভাটা থেকে নির্গত ধোঁয়া :**
প্রভাব : (i) চোখজ্বালা, (ii) শ্বাসকষ্ট।

③ **কৃষিক্ষেত্রে ব্যবহৃত রাসায়নিক সার ও পেস্টিসাইড দূষণের প্রভাব :** (i) ক্যানসার, (ii) আর্থ্রাইটিস, (iii) ব্রাঙ্কাইটিস, (iv) মিথেমোগ্লোবিনেমিয়া, (v) ফুসফুস ও বৃক্কের সমস্যা, (vi) মস্তিষ্ক ও কেন্দ্রীয় স্নায়ুতন্ত্রের ক্ষতি, (vii) রক্তচাপ বৃদ্ধি, (viii) কলেরা, (ix) টাইফয়েড, (x) আমাশয়, (xi) চর্মরোগ ইত্যাদি।

④ **ইউট্রোফিকেশনের প্রভাব :**

(a) **জৈবিক প্রভাব :** অ্যালগাল ব্লুমের সৃষ্টির ফলে জলে সূর্যরশ্মি প্রবেশ করতে পারে না, ফলে জলে অক্সিজেনের পরিমাণ কমে যায় এবং জলে ক্ষতিকারক কীট-পতঙ্গের বংশবিস্তার ঘটে।

(b) **আর্থসামাজিক প্রভাব :** (i) জলজ বাস্তুতন্ত্রের ভারসাম্য বিঘ্নিত হয়। (ii) জলজ প্রাণীরা মৃত্যুর মুখে পতিত হয়। (iii) মিষ্টি জলের ঘাটতি। (iv) বিভিন্ন জলবাহিত রোগের প্রাদুর্ভাব।



চিত্র 17.2 : ইউট্রোফিকেশনের প্রভাব

c দূষণ প্রতিকারের উপায় (Preventive Measures of Pollution) :

① পেস্টিসাইডের পরিমিত ব্যবহার।
② রাসায়নিক সারের বদলে জৈব সার-এর ব্যবহার।
③ কঠিন বর্জ্যবস্তু জলে না ফেলা।
④ যে জলাশয়ের জল ব্যবহারের উপযোগী সেখানে গবাদি পশুর স্নান বন্ধ রাখা দরকার।
⑤ জলদূষণ সংক্রান্ত আইনগুলি মেনে চলা।
⑥ জনসচেতনতা বৃদ্ধি করা।

আলোচনা (Discussion) :

শহর ও শিল্পাঞ্চলের দূষণের মতো গ্রাম্য এলাকার দূষণ ব্যাপক পরিমাণে না হলেও তা ধীরে ধীরে বেড়েই চলেছে। এই দূষণ নিবারণের ব্যাপারে জনগণ নিজের থেকে সচেতন না হলে তা পরবর্তীকালে ভয়ংকর রূপ নিতে পারে। তাই জনজীববৈচিত্র্য-কে রক্ষা করতে গেলে দূষণ নিবারণের বিভিন্ন পন্থা অবলম্বন করা অত্যন্ত জরুরি।

তথ্যসূত্র (References) :

① প্রারম্ভিক প্রাণীবিদ্যা—দ্বিতীয় পত্র (ব্যানার্জী, দেব, গিরি)।
② পরিবেশ—ড. অনীশ চট্টোপাধ্যায়।
③ জীবভূগোল ও পরিবেশ—ড. বিশ্বজিৎ বেরা, ড. সুমনা ভট্টাচার্য, নৈঋতা সেনগুপ্ত।

Viva-Voce

1. গ্রাম্য পরিবেশ দূষণের উৎস কী?
✔ (i) ইট ও চালিভাটা, (ii) পেস্টিসাইড, (iii) ডিটারজেন্ট, (iv) গৃহস্থালির আবর্জনা।

2. ধোঁয়া মানুষের উপর কী প্রভাব ফেলে?
✔ (i) চোখজ্বালা, (ii) শ্বাসকষ্ট।

3. রাসায়নিক সার ও পেস্টিসাইডের দূষণের প্রভাব লেখো।
✔ (i) ক্যানসার, (ii) চর্মরোগ, (iii) ফুসফুস ও (iv) বৃক্কের সমস্যা।

4. ইউট্রোফিকেশন-এর প্রভাব বলো।
✔ (i) জলজ বাস্তুতন্ত্রের ভারসাম্য বিঘ্নিত হয়, (ii) জলে অক্সিজেনের পরিমাণ কমে যায়, (iii) জলের দূষণ ঘটে।

5. ইউট্রোফিকেশন কী?
✔ কোনো জলাশয়ে রাসায়নিক পদার্থ মেশার ফলে জলজ উদ্ভিদের ব্যাপক বৃদ্ধি ঘটে এবং জলে অক্সিজেনের ঘাটতি দেখা যায়, একে ইউট্রোফিকেশন বলে।

SIDHO KANHO BIRSHA UNIVERSITY

Ability Enhancement Compulsory Courses (AECC)
ENVIRONMENTAL STUDIES

ACHHRURAM MEMORIAL COLLEGE, JHALDA, PURULIA

FOR PROGRAMME

SEMESTER – 1

2023

PROJECT WORK

ON

POLLUTION ISSUES IN RURAL AREAS

NAME – Manisha Mahato

ROLL NUMBER – 101252-22 30301

REGISTRATION NUMBER – 000691 of 2022-23

MARKS OBTAINED – 10

SIGNATURE OF THE EXAMINER-

Study on Rural Environmental Pollution

Introduction:

Rural areas, often characterized by agricultural activities and dispersed human settlements, face unique environmental pollution challenges that impact natural resources and human health. Understanding these challenges is essential for implementing effective mitigation measures and promoting sustainable rural development.

Problems:

1. **Water Contamination:** Runoff from agricultural fields containing pesticides and fertilizers can pollute water bodies.
2. **Soil Degradation:** Overuse of agrochemicals and improper soil management practices lead to soil erosion and degradation.
3. **Air Quality:** Biomass burning, vehicle emissions, and dust from unpaved roads contribute to poor air quality.
4. **Noise Pollution:** Agricultural machinery, livestock operations, and rural industries contribute to noise pollution.

Objectives:

1. To assess the impact of agricultural practices on water and soil quality in rural areas.
2. To evaluate air quality and identify sources of pollution in rural environments.
3. To examine the health effects of environmental pollution on rural populations.
4. To recommend policy interventions and community actions for pollution control and sustainable development.

Method of Data Collection:

1. **Water and Soil Sampling:** Collect samples from agricultural fields and nearby water bodies for analysis of nutrient levels and pesticide residues.
2. **Air Quality Monitoring:** Deploy air quality sensors in strategic locations to measure particulate matter, ozone, and nitrogen oxides.
3. **Health Surveys:** Conduct health surveys and interviews with local residents to assess respiratory and other health impacts.

4. **Community Engagement:** Organize focus group discussions and workshops to gather local knowledge and perspectives on environmental issues.

Discussion:

The study identified significant pollution from agricultural activities, with high levels of nutrients and pesticides detected in water and soil samples. Air quality monitoring revealed elevated particulate matter concentrations near busy roads and agricultural areas. Noise pollution from agricultural machinery was also a concern, affecting both human health and wildlife.

Suggestions:

1. **Sustainable Agricultural Practices:** Promote organic farming and integrated pest management to reduce chemical inputs.
2. **Afforestation and Soil Conservation:** Implement measures such as agroforestry and terracing to prevent soil erosion.
3. **Clean Energy Initiatives:** Encourage the use of renewable energy sources and cleaner technologies in rural areas.
4. **Policy Support:** Advocate for policies that incentivize sustainable practices and regulate pollution from rural industries.

Limitations of Study:

1. **Resource Constraints:** Limited funding and technical expertise may restrict the scope of data collection and analysis.
2. **Seasonal Variability:** Environmental conditions and pollution levels may vary seasonally, requiring long-term monitoring.
3. **Community Participation:** Engaging rural communities in data collection and implementing recommendations may pose challenges.

SIDHO KANHO BIRSHA UNIVERSITY

Ability Enhancement Compulsory Courses (AECC)

ENVIRONMENTAL STUDIES

ACHHRURAM MEMORIAL COLLEGE, JHALDA, PURULIA

FOR PROGRAMME

SEMESTER – 1

2023

PROJECT WORK

ON

POLLUTION ISSUES IN RURAL AREAS

NAME – Sachin Mahato

ROLL NUMBER – 10125220304137

REGISTRATION NUMBER – 00827 of 2022-23

MARKS OBTAINED – (10)

SIGNATURE OF THE EXAMINER-

Study on Rural Environmental Pollution

Introduction:

Rural areas, often romanticized for their natural charm and pristine environments, are increasingly confronted with environmental challenges stemming from diverse pollution sources. This project aims to delve into the various facets of environmental pollution in rural settings, exploring its types, origins, impacts, and potential mitigation strategies.

Objectives:

1. Identify the sources of pollution prevalent in rural environments.
2. Analyze the repercussions of pollution on the quality of air, water, and soil in rural areas.
3. Assess the health and socio-economic implications associated with environmental pollution in rural settings.
4. Propose sustainable solutions and strategies to mitigate rural pollution effectively.

Types of Pollution in Rural Areas:

- **Air Pollution:** Arising from agricultural activities (crop residue burning, pesticide use), biomass combustion, and vehicular emissions.
- **Water Pollution:** Caused by agricultural runoff containing pesticides and fertilizers, improper waste disposal practices, and contamination from industrial operations.
- **Soil Pollution:** Resulting from pesticide and fertilizer residues, improper disposal of waste, and industrial pollutants.

Causes of Rural Environmental Pollution:

- **Agricultural Practices:** Intensive farming techniques, utilization of chemical fertilizers, and pesticides.
- **Domestic Sources:** Improper handling and disposal of waste, including open burning.
- **Industrial Activities:** Small-scale industries lacking adequate pollution control measures.

Effects of Rural Environmental Pollution:

- **Health Impacts:** Respiratory ailments, waterborne diseases, and skin disorders.
- **Ecosystem Degradation:** Decline in biodiversity, soil erosion, and contamination of water bodies affecting aquatic life.
- **Social and Economic Consequences:** Diminished agricultural productivity, heightened healthcare expenditures, and adverse impacts on rural livelihoods.

Mitigation Strategies:

- **Promotion of Sustainable Agriculture:** Encouraging organic farming practices and integrated pest management.

- **Improved Waste Management:** Promoting composting, recycling initiatives, and responsible disposal methods.
- **Community Awareness and Education:** Conducting workshops and campaigns focused on environmental conservation.
- **Policy Interventions:** Enforcing stringent regulations to uphold pollution control measures in industrial sectors.

Conclusion:

Rural environmental pollution poses formidable challenges to both sustainable development and public health. Through comprehensive understanding of its origins, impacts, and strategic implementation of mitigation measures, safeguarding rural environments becomes achievable, thereby enhancing the quality of life for rural communities.

Recommendations for Further Research:

- Long-term monitoring of pollution levels across diverse rural areas.
- Comparative studies analyzing pollution profiles among different rural regions.
- Evaluation of the efficacy of implemented mitigation measures in addressing rural environmental issues.

A FIELD REPORT ON PHYSICAL AND HUMAN LANDSCAPE OF AJODHYA HILL REGION OF PURULIA DISTRICT, WEST BENGAL WITH SPECIAL REFERENCE TO LAHADUNGRI AND CHHATNI VILLAGE.

S. Sen
21/12/22

Introduction:

Fieldwork is an approach through which geographi-cal knowledge and skills can be acquired practically in the field. The field is the major source of primary geographical information (data). Therefore fieldwork involves observation, interp-reting what is observed and recording the relationship on the human and physical environ-ment.

Fieldwork - in geography is conceived as field of study, concerned with the physical and human landscape of a ~~geg~~ region and whose teaching must be based on three-fold study approach namely.

Observation.
Recording and interpretation.
Making if generalisations based on this approch.

Significance of field work in Geographical studies:

1. It is of great pedagogical importance as it let students experience the geography of a particular region which theoretical texts can't do.

2. Field surveys enhance our understing about patterns and spatial distributions, their associations and relationships at the local level.

3. Field surveys facilitate the collection of local level information that is not available through secondary sources.

4. It is very important as it helps to- gather required information, so as the problems under investigation is studied in depth as per the predefined objectives.

5. Field studied enable the investigator to comprehend the situation and processes in totality and at the place of their occurrence.

6. As the geographical skills are used in practical field work. you get to learn and apply the skills of sampling, data collection, data processing, making questionnaires, map making, statistical techniques to derive results, observational skills and skills of interviewing etc.

7. It helps you understand the theoretical concepts better.

8. It gives you a chance to enjoy a wide variety of environments and landscape.

9. Develops an understanding and sensitivity about the culture and people of field area. This may change your biased views about that community.

10. And most importantly, it is enjoyable and gives you a great memorable experience.

Location map of The Study Area

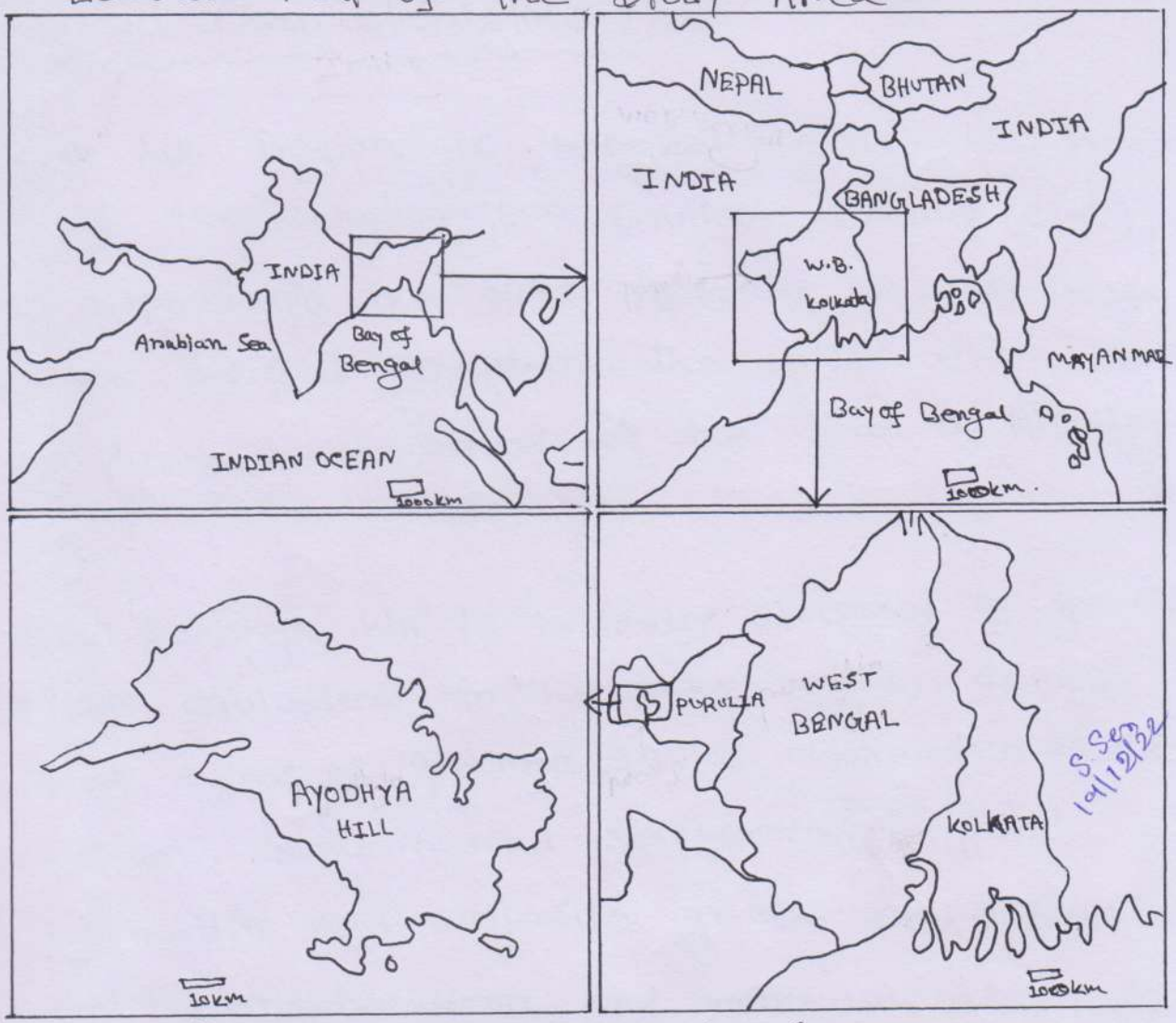


Fig: Location map of The Study Area

The Study Area:

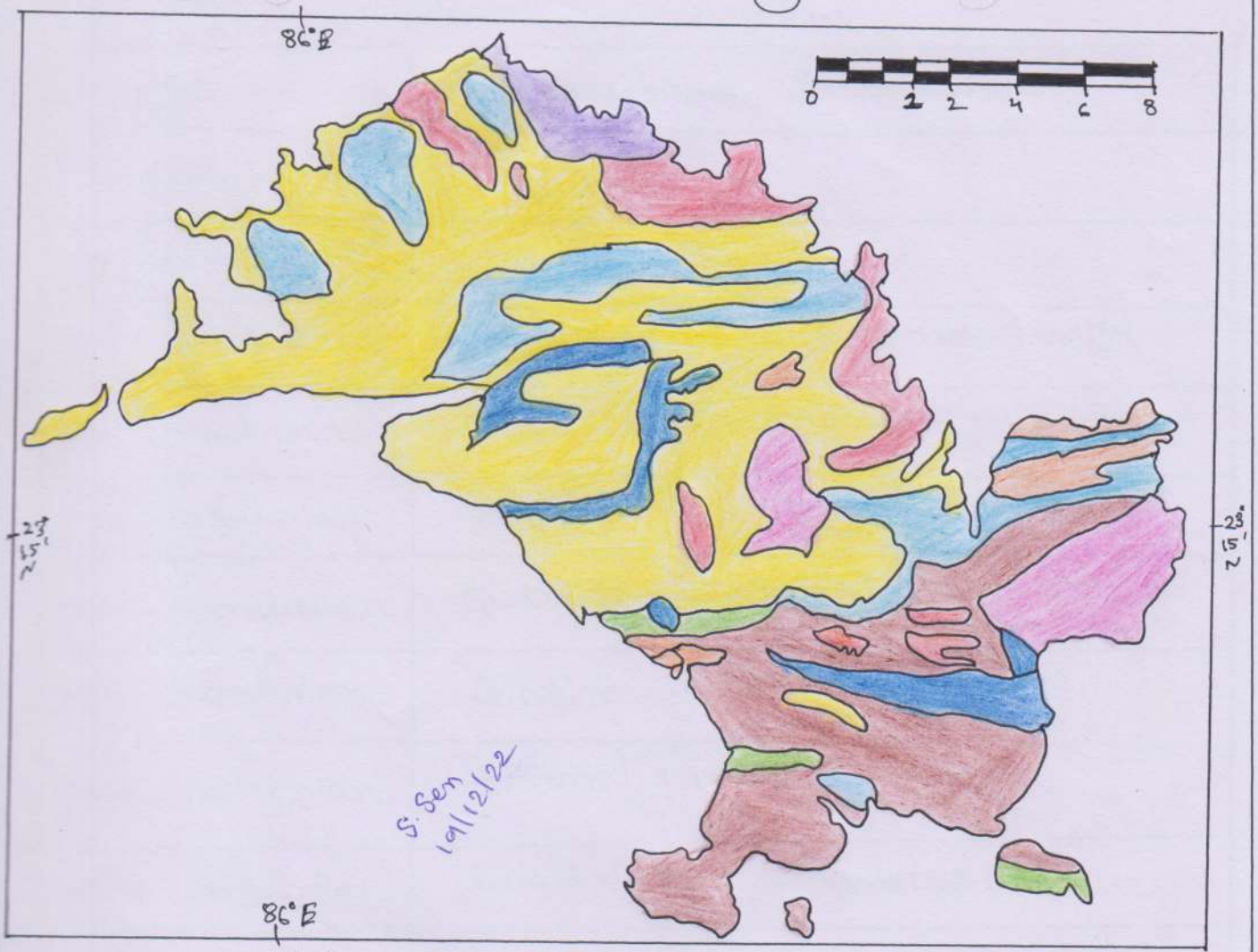
The Ajodhya hill region is a small plateau which is located in South-western part of purulia district, west Bengal and is a metamorphic terrain of pre-cambrian antiquity. This hill area covers 401.4km² area of purulia district. Mainly Baghmundi, Arsha and parts of Balarampur blocks are included in this region. The average height of this region is 300 to 650 meter. The highest peak of this is chamtaburu (699m.).

Geological Characteristics :

Ajodhya hill region is geologically a detached remn-ant of the Chhotanagpur Gneissic complex (CGC), which represents the oldest terrain of west Bengal. It is an uplifted peneplain. The upliftment occurs during Pleistocene period at the time of Himalayan orogeny.

The Ajodhya hill is basically composed of geneiss-ic rocks equivalent to the chhotanagpur gneiss. Different types of granite-gneiss characterise the Southeastern, southern and Southwestern parts, while migmatite and composite gneiss are predomin-ant over the Northeastern and northern parts. Besides there are some scattered enclaves of mica-schist, amphibolites and ~~northern~~ intruded bodies of porphyritic granite, massive granite and pegmatite and quartz vein. Being an integral part of the Pre-cambrian tract of chhotanagpur Gneissic complex (CGC), which was tectonically active for more than 1.6 billion years, the Ajodhya hill has witnessed a complex evolutionary history, marked by poly-phase tectonic movements, magmatic activities and metamorphism

Geological Map The Ajodhya Hill Area



LEGEND

Recent		ALLUVIUM
PRE CAMBRIAN		GRANITE & GRANITE GNEISS
		BIOTITE GNEISS
		QUARTZ BIOTITE GNEISS
		COMPOSITE GNEISS MIGMATITE
		AMPHIBOLITE
		QUARTZ BIOTITE SHIST
		PORPHYROBLASTIC GRANITE GNEISS
		MICA SHIST

FIGURE 3 : GEOLOGICAL SET-UP OF THE AJODHYA HILL IT'S SURROUNDING

SOURCE : PHOTOGRAPHY AND REMOT SENSING OF GSI EASTERN REGION, CULCUTTA.

Table - 1. Stratigraphic Succession of Ajodhya Hill.

Age	Lithological Succession.
Recent	Alluvium.
pre-cambrian	Dolerite.
pre-cambrian	pegmatite and quartz vein.
pre-cambrian	Massive leucogranity.
pre-cambrian	porphyritic biotite granite.
pre-cambrian	Quartzo feldspathic Gneiss.
pre-cambrian	Biotite-gneiss.
pre-cambrian	quarte-biotite gneiss
pre-cambrian	banded biotite gneiss.
pre-cambrian	Amphibolites (massive).
pre-cambrian	Quartz-biotite schist.
pre-cambrian	Biotite-schist.
pre-cambrian	Banded, quartz biotite gneiss.

Morphological characteristics:

On the basis of morphological characteristics, three geomorphic sub units have been identified in this plateau area - a) the almost flat plateau top with isolated peaks and hillocks.

b) the break-of slope zone which is basically a steep, escarpment like transitional unit connecting the plateau top above and foot hill area below.

c) The piedmont zone at the food hill. Standing about 300m above the surrounding plain, the Asodhya hill acts as a watershed between the kangsaboti drainage system in the north and northeast and the Subarnarekha Drainage System in the Southwest.

It is predominantly composed of gneissic rocks, and being located in the sub-humid tropical climate, is exposed to both physical and chemical weathering processes of rock breakdown. Among the processes of mechanical distintegration, joint block separation is very common. The process is predominant along the highly fractured escarpment slopes. Exfoliation is also an active process on the dome shaped hillocks around Matha. The chemical processes of rock decomposition are operating mainly on comparatively

gentle slopes and flat areas. The profile of weathering, consists basically of four layers. These area - a) The uppermost layer of sand and soil (1m-6m thick), b) the transitional layer of highly weathered rock fragments or boulders held in thick soil matrix (1m - 5m. thick), c) The zone of partiaw weathered rock (3m - 7m thick) and d) The lower most layer of fresh rock. In Ajodhya hill, the end product of weathering contains kaolinitic clay and insoluble silica forming a matrix within which boulders and pebbles of rocks are embedded. But the percentage of clay content in the weathered residuum is not very high, it is only 15% to 22%. Hard indurated layer is noted only in the south central part of the hill over a limited area, the absence of hard duricrust layer suggests the weathering has not reached the advanced staye here.

Physiographical set-up :

The district of purulia forms the last two steps in the descent from the hills and plateaus of central India and chhotanagpur plateau to the Damodar plains of west Bengal. According to the structure and landsforms, purulia is a part of the Ranchi peneplain physiographically it is a shield - rimland, displays typical old-age characteristics of a moderate absolute altitude and moderaty low relative relief Ajodhya hill marks the absolute relif, marked by a line of sharply rising but almost flat-topped arches covered by luxurious vegetation. The rest of the district has a gently undulating topography with occasi-onal hillocks. These are residual hills produced by dissection of ancient plateau which has been eroded down to produce the present landform. The 300m contour line is the dividing line between the higher peneplain of Ajodhya and the lower undulating plains of the rest of the district. The uplifted lands rise very steeply from 300 m., but the slope become moderate above 500m., the-re appears and uplifted peneplain surface.

This higher peneplain was sculptured in a

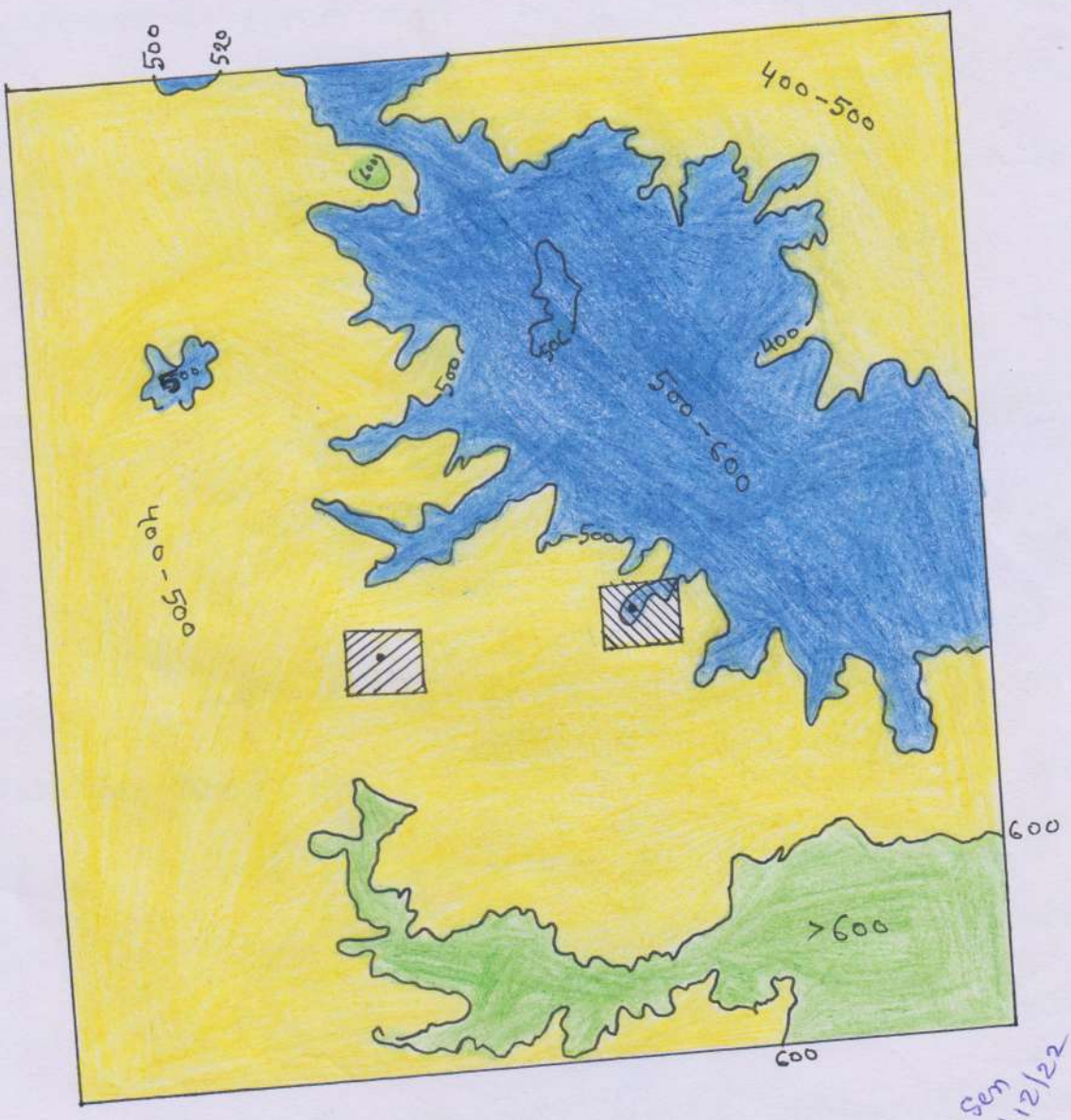
a previous cycle of erosion when the climate was probably more humid. The current sub-humid cycle of erosion has produced a youthful stage of landforms on this old uplifted peneplain. It is bondered by steep escarpments and heavily dissec-ted by headward eroding streams. Degradation of previous cycle and dissection of the present cycle are the two common features of the high-land zones, marked by dissected ridges with outward facing scarps and waterfalls. The landsca-pe of the lower peneplain is more senile, for the few higher hills are mere isolated remnants above a wide, gently sloping eroded platform havi-ng an altitude between 150 to 300 meters.

Fig: Physiography

Fig: Physiography

S. Sen
21/12/22

Altitudinal Zones of The Study Area



S. Sen
10/12/22

Study Area

Lahadungri
Chhatni

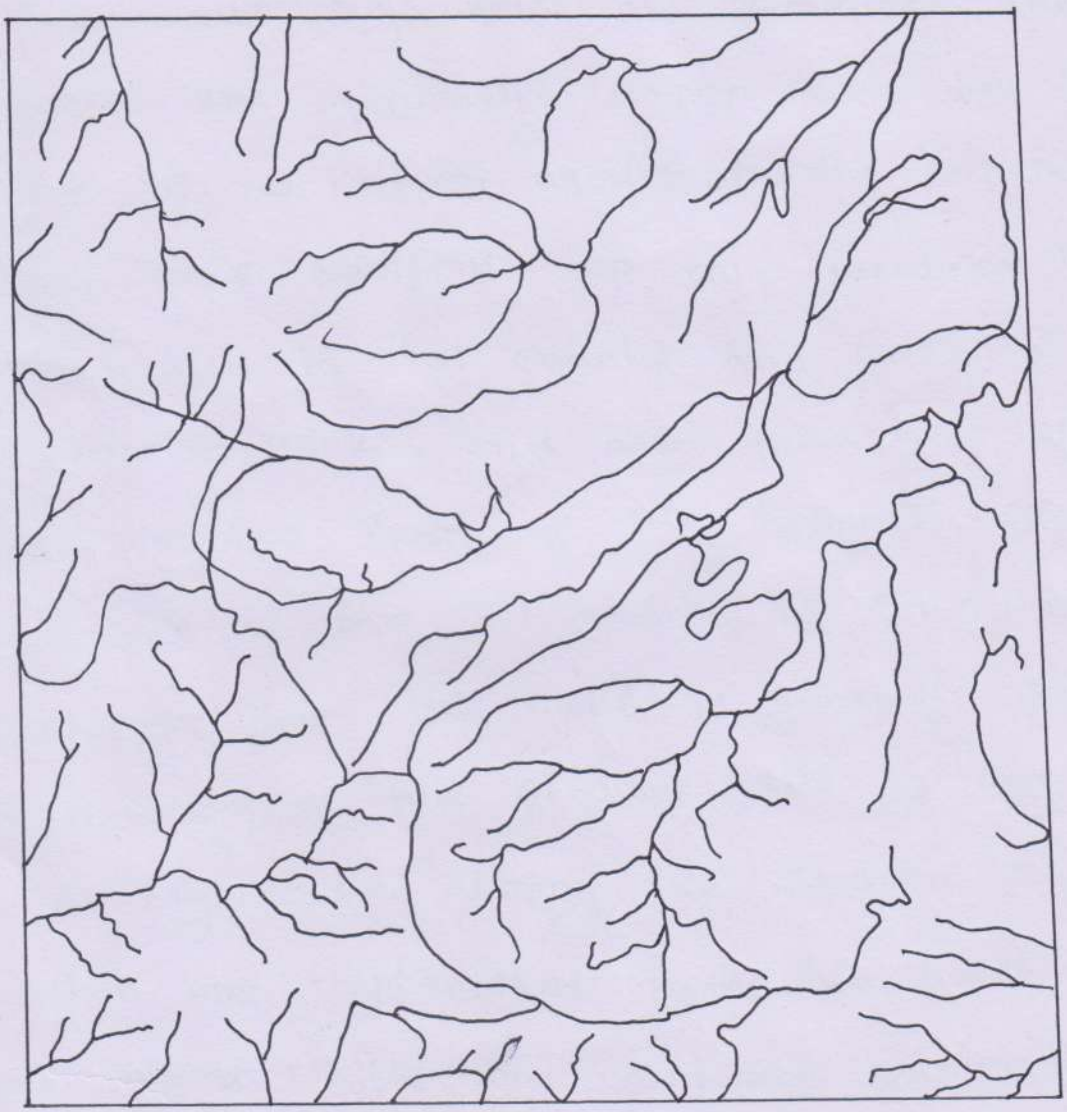
INDEX

>600
500-600
400-500
300-400

Drainage :

Following the natural slope of the region all the rivers which interest on take their rise within it, have a northerly on south-easterly course. The 600m. contour line act as a watere-divide between the two basins. Northern part falls within the Kangsabati Basin and the south easterly flowing rivers falls within the Subarnarekha Drainage system. All of the rivers are very small (not more than 3 kilometres in length), non-perennial with very slow river-bed. Actualy these rivulets are active only in rainy season, when occasional occasional heavy rain occurs and subject to flash flood. All of these rivers are characterized by shallow river beds. Their beds are usually 1/2 meters to 1 meters in depth and 3 to 5 m. in width with gravels and sand. Their banks are not-abrupt, but broken with hills and occasionally gullies. All of these streams flows towards the scarp zone and plunges down through the scarps forming small gorge-like features, rapids and sometimes water-falls. The entire district has numerous small storage pools called bandhs. It's a easy way to conserve the water.

Drainage Map of The Study Area



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Scale

Ground water:

The entire district is very poor in her ground water resources because of her crystalline basement. where surface water is not readily available, the inhabitants resort to extraction of the ground water by dug wells / tube wells. Dug wells are generally shallower. Tube wells are generally deeper than dug wells but there is no proper aquifer in the impervious crystalline, this aquifers tap only localised water bodies collected in the cracks and crevices of the impervious rocks, and also from the upper weathered in the zone of the bedrock. where the thickness of the soil mantle is considerable, the discharge from this wells is generally satisfactory. A majority of the shallow wells go dry or retain scanty water during the summer. The groundwater ~~are~~ replenished from the floods of seasonal rivers which dry up during winter and summer and from the percolation of rain water.

Although a major part of the district is essentially underlain by hard massive crystalline rocks, It is usally mantled by a thin top soil and regolith material, resulting partly from detrital sediment of

highlands and mostly from weathering of rocks below. This mantle of weathered products is found to vary from a thin veneer to about 12 meters in thickness vertically, the mantle can be divided into the following parts: (a) a top soil containing humus (in the wooded tracts); (b) regolith, representing, the denuded products of unaltered rocks and (c) partially weathered rock fragments on gravel which are underlain by unaltered rocks. weathering of granite and schistose rocks yields a sandy clay, the clay being derived from the alteration of feldspar and mica, while the granite and quartz and other resistant minerals are retained in the form of sand and silt. The resulting material is loose, porous and somewhat granular in nature.

circulation of ground water in the terrain is effected mainly through the zone of weathering and to a lesser extent through interconnected joints, cracks, fissures, etc. In underlying hard massive rocks. Rainfall is the main source of ground water recharge. But a major part of the precipition passes away as surface runoff with only a minor proportion contributing to the groundwater by infiltration and precipitation through the zones of weathering and the joints and

fissures in the unweathered rocks below. The zone of weathering below the water-table has the capacity to store water and also allows the flow of groundwater in the area. The depth of water-table varies from less than 12m. in summer months.

Paleogeography:

The paleogeography of Purulia is very interesting. It's crust was formed into a land surface, some three thousand million years ago. They formed an integral part of peninsular shield of India. Due to millions of years of denudation under various climate conditions, the extreme variety of Archaean rocks are only feeble expressed by its topographic features. But it is very clear that geomorphic units of the district are their existence to two major relief features.

1. The peninsular shield of Archaean era.
2. The Gondwana basin filled up by sediments and woody materials during the upper carboniferous-Triassic periods.

It is the peninsular shield that forms the greater part of the district forming hills and rolling

peneplains and providing basement on which Gondwana sediments were deposited along a narrow belt to the north of the district. From beneath the thin soil covers of very recent period, appears the the granite-gneiss of the Archean age except where the geneissic basement is overlain by metamorphic rocks of Dharwar age (2500 to 2100 million years old).

SOILS:

Soils of this area is mainly Red yellow soil which is rich nitrogen but potash contain is lacking. This type of soil environmentaly water consuming soil i.e, if sufficient water is available moderate to goods crops are possible to cultivate, but due to unavailability of water during the summer and winter season this area is now totaly monocro-pped, where main crop is paddy. In winter, vegetables are also cultivated. Accoding to the USDA classification the soil of this area is fall under the Alfisol type.

The olden alluvium of pleistocene to sub-recent age can be marked at the study area.

These are coarse grained generally reddish in colour and contain abundant limonitic calcareous concretions. generally reddish in colour and contain abundant limonitic and calcareous concret-ions. The newer alluvium of sub-recent to recent age also occur in patches along the subarnare-kha, kasai, and Damodar rivers. But the most noteworty occurrences is on the Baghmundi-Dalma saddle.

The district of purulia is mostly covered by residual soils formed by weathering of Bedrock i.e, the decomposed and disintegrated rocks have formed the soils and these have remained in situ. weathering processes are destractive, but soil forming processes are constractive. In purulia, the weathering process are more active and so the plains are mostly erosional with very thin soil covers. Geologically these soils are olders but immature compared to the alluvium. Ecologically, however, they are not old enough to erosion, the soils get enriched by chemical decomposition of parent material and organic matters and develops,

into mature soil. But as soon as the vegetation cover is removed these residuals soils are severely depleted by mechanical weathering and erosion.

In purulia, gneissic soil are predominate, follow-ed by Gondwana soils on sedimentary rocks and transition soils (on-sub-metamorphic rocks) with varying depths, composition, fertility status and crop response. Gneissic soils are usaly sandy-loams, of low fertility. Leaching of calcium from the upper horizons due to heavy downpours, concentration of iron and aluminium at or near the surface of the soil is called laterization. most of the gneissic soils of purulia are subject to laterization. the colours of the lateritic soils are very from light red to brown depending on the mineral matter. the Gondwana soils are coarse textured and sandy.

Natural Vegetation:

The natural vegetation of purulia is essentially arboreal. It has, however, been cleared and degraded or replaced by shrubs, bushes, meadows, and cultivated fields to such and extent that this statement has little practical significance today. It was indeed, a land of tropical moist deciduous forests which have now degraded into tropical dry

deciduous forests due to biotic interference, such as shifting cultivation, fire, grazing and also unscientific forest management, such interference have affected flora of the district either by checking the progression of vegetation to the higher succe-ssional stage or by bringing about a regression.

Looking down from the highlands three types of vegetational landscapes may be identified. Firstly, patches of land, under cultivation will seem to dominate on the better watered plains of the background. Secondly, on the more undulating surfa-ces will appear savannah-like widely spaced low trees and patches of grasses, shrubs and tufts of various annuals. Dry season, high temperatures and high rate of evaporation hinders the growth of trees and causes those which do grow to take on a stunted and scrubby appearan-ce. Even the grasses and scrubs do not form continuous cover. They grow singly or in groups in specially favoured areas where is greater rainfall or where the soil collect and hold more moisture. The more important plants are ash-sheora, bel, chatta, sadina, bhat, ~~hold more moisture~~. gota begun and

and various other species of the same family, besides dumur, pipal, tentul, kadam, kanam, mahua, kend, banyan, simul, mango, nim, kul, amra, palas, siris etc.

Of the various weeds, creepers, hedges and other stunted shrubs found mainly in badlands. In the scrub jungle of uplands the more distinguishing constituents are chanlai, gumhar, dacom, kunchi, indrajab, nishinda, asan etc. the scrub jungle gradually merges into the forests, where, due to more favourable environment, large trees grows together and forms the third type vegetational landscape.

The large gregarious 'Sal' is the most predominant forest trees. There are two varieties of 'Sal' (shorea robusta)- the most prevalent, having a dankbrown heartwood, while that of the 'Dom Sal' (miliusa velutina) of the lower hills is white slightly tinged ~~whit~~ with red. Orthers important trees are muchkunda, shimul, palas, bel, tun, kul, ~~lang~~ kusum, siris, asan kadam, kanam etc.

Natural Vegetation Map

INDEX

Settlement with agricultural land -

Forest -

Scale

Km 1 0 1 2 3km

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Fig: Natural vegetation

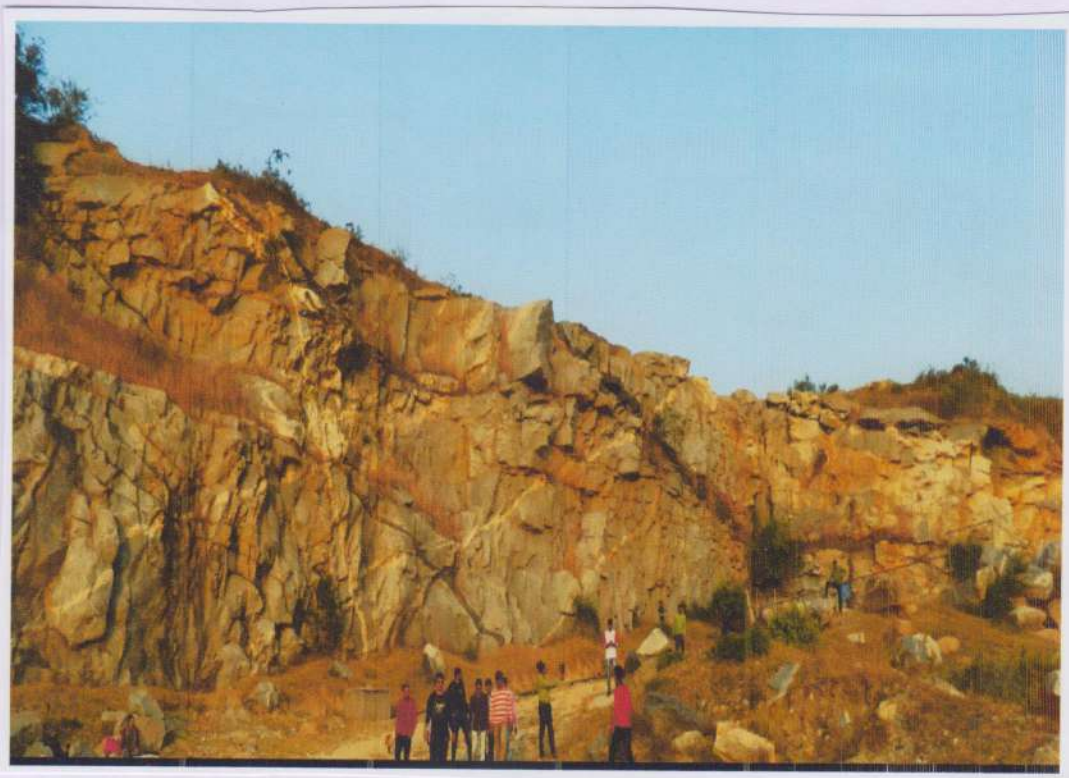


Fig: Geology

climate:

The climate of this district is characterized by a hot summer and well distributed seasonal rainfall. The year may be divided into four seasons. The cold season starts by about the middle of November and continues till the end of February. This is ~~not~~ followed by the hot season which extends up to may. The southwest monsoon season which follows thereafter, continues up to end of September, october and the first half of november constitute the post-monsoon season. The average annual rainfall in the district is 1363.1 mm. the rainfall generally increases from the north-west towards the South-west in the district. It is heaviest, in the hilly areas to the west. on an average there are 71 rainy days (i.e days with rainfall of 2.5 mm. or more) in a year in the district. In chilly weather for a day or two. may is the hottest month of a mean daily maximum temperature of 40.3°C and a mean daily minimum of 27.2°C. On some days during the may and june, the day temperature are ~~not~~ sometimes pushed up to about 45 or 46°C

by dry land winds. January is the coldest month with the mean daily maximum at 25.5°C and mean daily minimum of 12.8°C. in association with the passage of western disturbances across north India spells of cold weather are sometimes experienced during the cold season, when the minimum temperature goes down to about 7°C. or 8°C. relative humidity are high during the monsoon season, being generally between 75% and 85%.

Fig! Door to door survey

Fig! Land use

Socio-economic condition of Lahadungri village (as per 2011 census)

Lahadungri is a small village located on Sinkaban-Ajodhya road, 4km from Ajodhya Hill Top area of this of this village is. 3.69 km^2

1. Total population - 115 (no of households - 24) (population density 31.16/km^2.
2. Male - 55 (47.82%), female - 60 (52.18%).
3. 0.6 age group out of total population - 18.26%., of which male (out of total male) - 20% and female (out of total femal) - 16.66%.
4. Sex ratio - 1090.90 -
5. All are ST population. No others caste is found.
6. Literacy rate (total) - 42.61%.
7. Literacy rate (male) - 56.36%.
8. Literacy rate (female) - 30%.
9. Illiterates - (total) - 57.39%.
10. Illiterates - (male) - 43.64%.
11. Illiterates - (female) - 70%.
12. Total workers out of total population - 63.48%
13. Total male workers out of total male population 60%.

14. Total female workers out of total female population - 66.7%.

15. Main workers out of total workers 36.99%.

16. Male main workers ~~opto~~ of total male workers 75.76%.

17. Female main workers out of total female workers 5%..

18. Among the four components of main workers, only cultivators and agricultural labourers are exist, but household industry workers and other workers are not exist in this village.

19. Cultivator out of total main workers 37.04%. (male 90%. female 10%)

20. Agricultural labourers out of total main workers 62.96% (male 94.11% and female - 5.89%).

21. Marginal workers out of total workers 63.01%. (male - 24.24%, female - 95%).

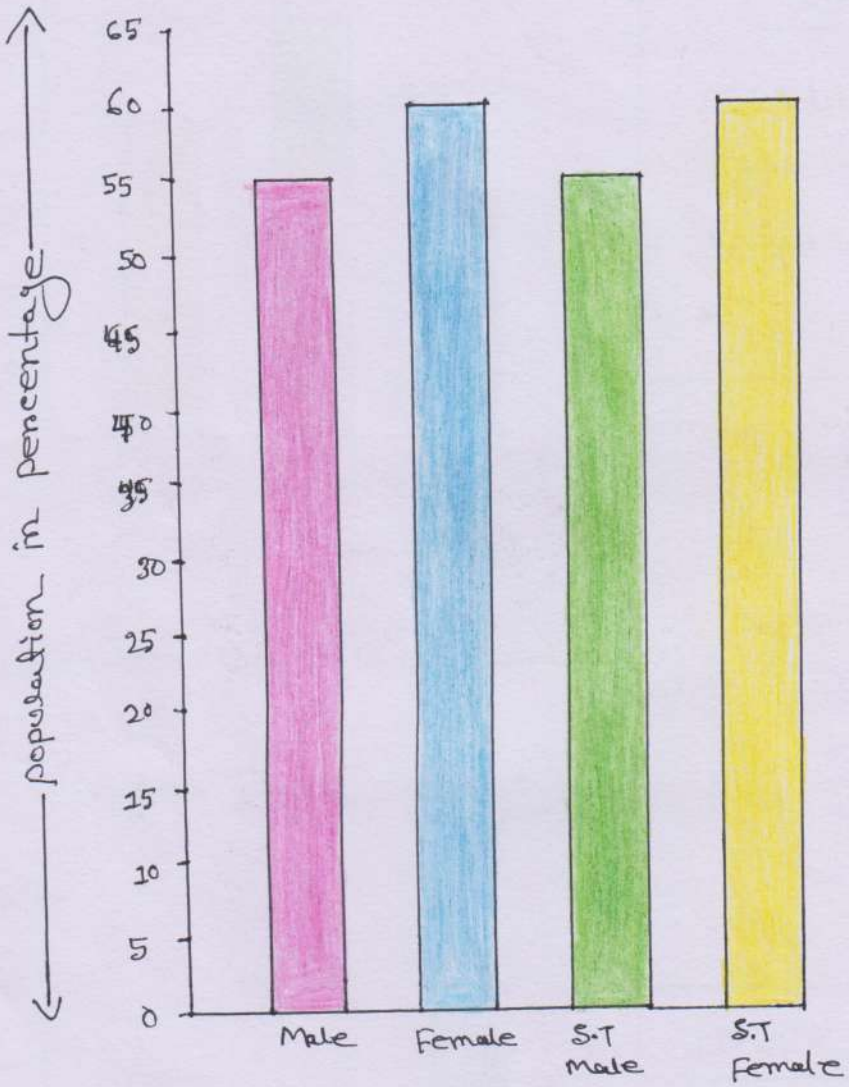
22. Non-workers out of total population 36.52%. (male 40%., Female - 33.33%).

23. Land use - forest = Nill, area under non-agricultural use = 9.6%, cultivable waste = 9.6%, Net area sown = 80.8%.

24. Total irrigated land - 0.91%, unirrigated land = 99.09%.

Population Characteristics of Lahadungri Village

(as per 2011 census)



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Male -

Female -

S.T. Male -

S.T. Female -

Vertical Scale 1cm = 5% population.

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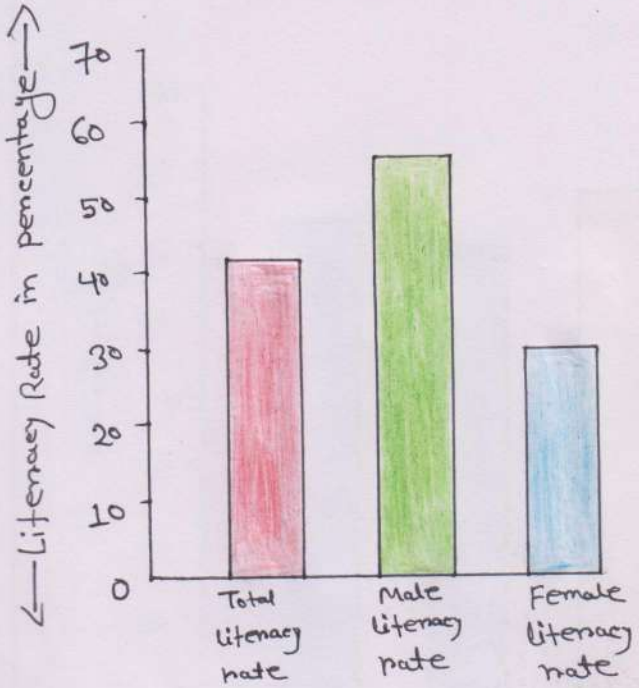
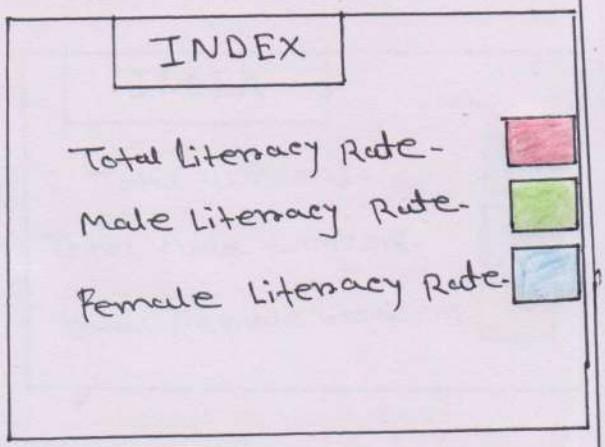
Literacy Rate of Lahadungni Village
(As per 2011 census)





vertical Scale 1cm to 10%. Literacy rate

Illiteracy Rate of Lahadungni village
(As per 2011 census)

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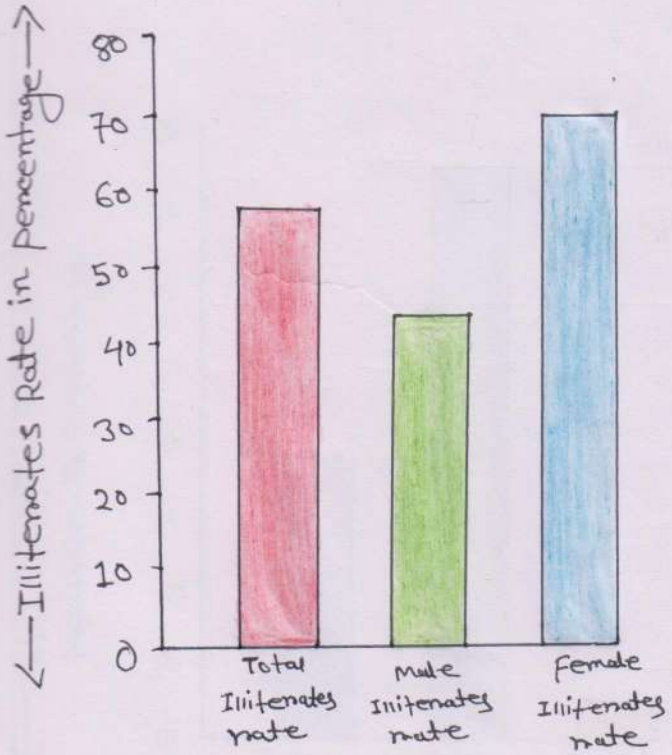
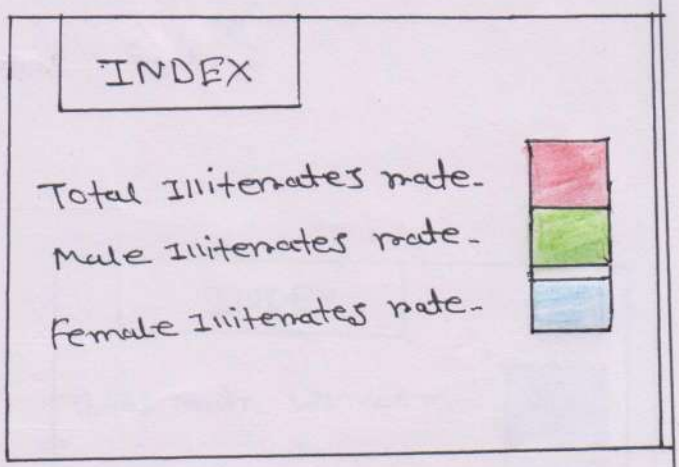


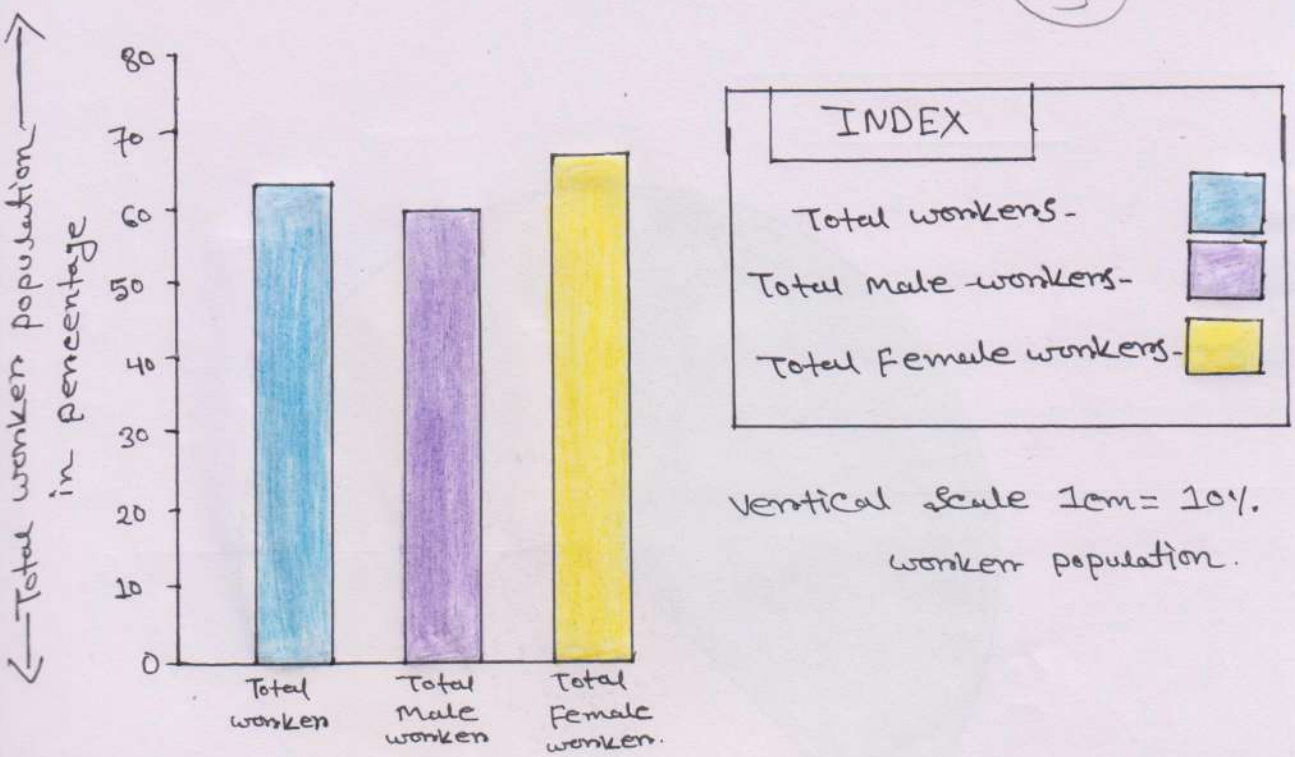


Vertical Scale 1cm to 10%, Illiteracy Rate.

Occupational Status

Worker population Rate of Lahadungri village (as per 2011 census)

(3)



Main worker population Rate of Lahadungri village (as per 2011 census)

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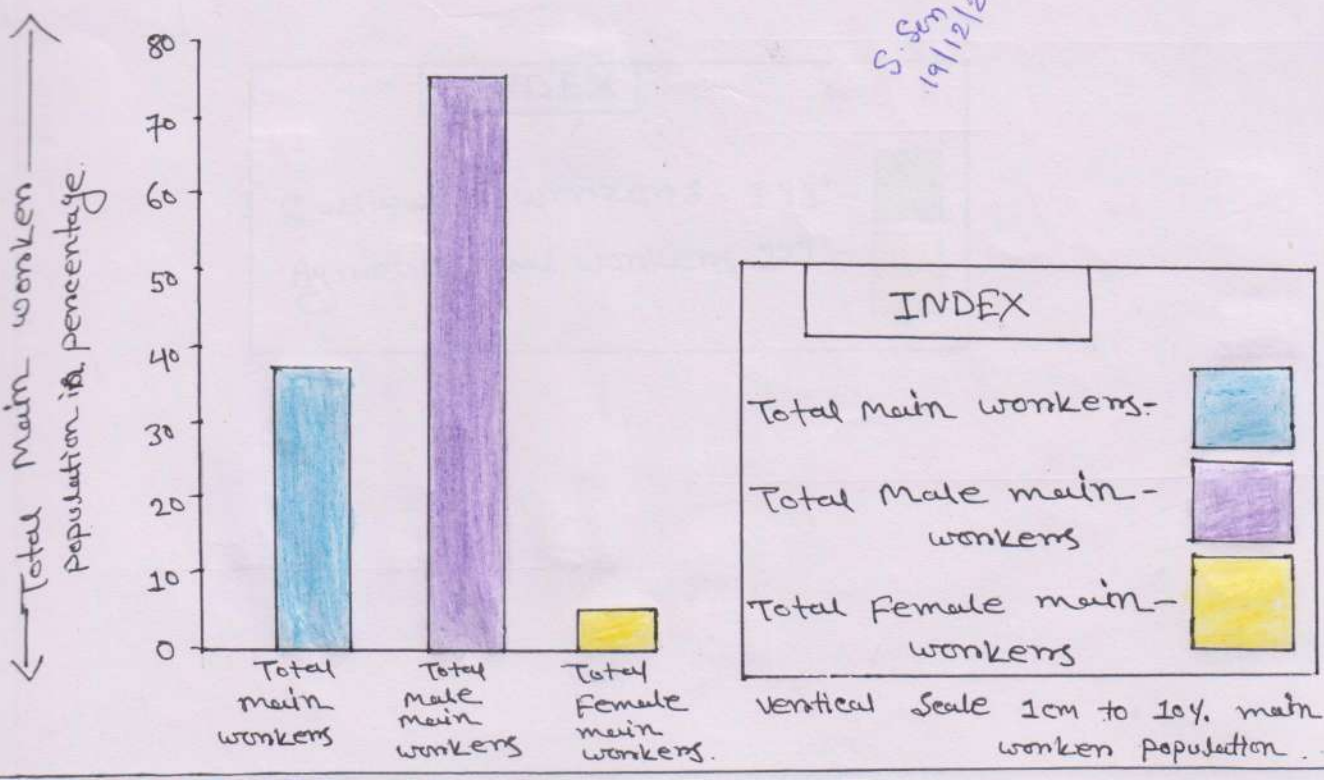
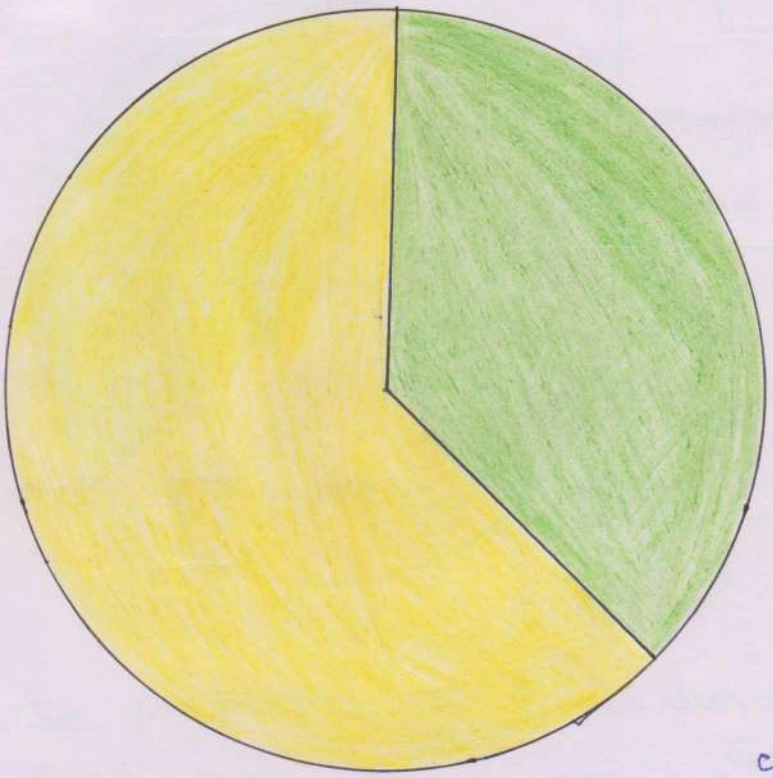


Land use pattern of Lahadungri village
(As per census 2011)



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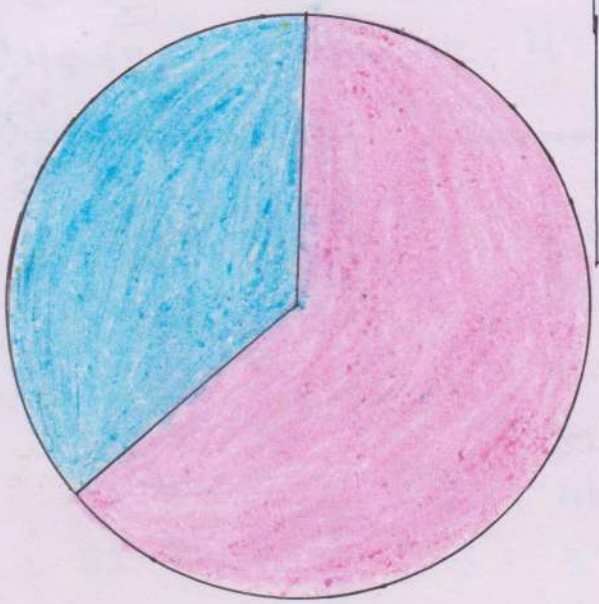
Cultivator workers - 133° -

Agricultural workers - 227° -

Workers Status of Lahadungri Village
(As per 2011 census)



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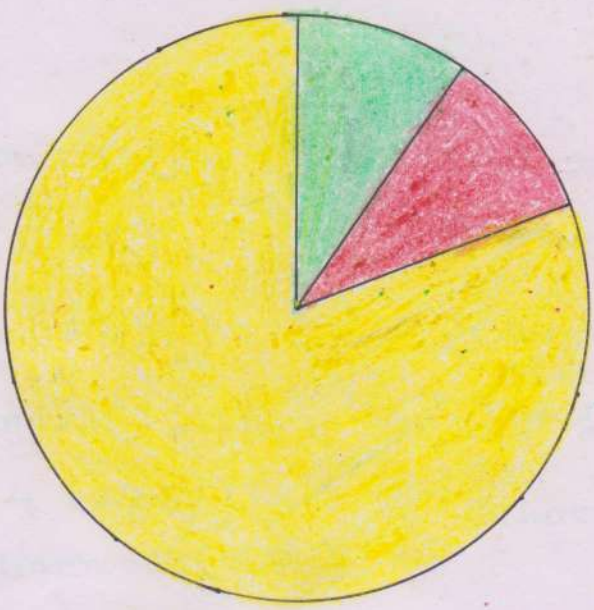
Marginal workers - 226°8'

None workers - 131°4'

Land use pattern of Lahadungri Village
(As per 2011 census)



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None Agricultural Area - 34°56'

cultivable waste - 34°56'

Net Area Sown - 290°8'

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Socio-economic condition of Lahadungni as per door-to door survey on 17.11.2022

1. Total surveyed house - 17
2. Average family size - 4.82
3. Male 40 (48.78%), Female - 42 (51.22%)
4. ~~Average~~ Age-group (male) ~~Avera~~ Age-group (female)

Age-group (male)	Age-group (female)
0-10 = 7	0-10 = 9
11-20 = 10	11-20 = 10
21-30 = 8	21-30 = 8
31-40 = 6	31-40 = 7
41-50 = 5	41-50 = 5
51-60 = 2	51-60 = 1
61-70 = ~~01~~	61-70 = 1
>70 = Nil	>70 = 1

5. Education Status

Male	Female
Total education = 32 (80%)	Total education = 23 (54.76%)
Primary = 8 (25%)	Primary = 4 (17.39%)
Secondary = 4 (12.5%)	Secondary = 2 (8.69%)
Higher secondary = 1 (3.12%)	H.S - 1 (4.34%)
Graduate = 4 (12.5%)	Graduate = 4 (17.39%)
School going children = 15 (46.87%)	School-going children = 12 (52.17%)
Non educated ~~children~~ = 8 (20%)	Non-educated = 19 (45.24%)

6. Occupational status

Cultivation = 12 (70.58%)

Wood cutter/gatherer = 4 (29.52%)

Service = 1 (5.88%)

7. main disease.

common feven - 15 (88%)

Diarrhoea - (53%)

other - (12%)

8. Newspaper use-4(24%)

9. Domestic animals -

Cow - 14 (82%), Goat - 16 (94%), Buffalo - 2 (12%)

10. Electricity - all.

11. Source of drinking water - Tube well (all).

12. use of fuel - wood.

13. House type - mud house with roof made by corrugated tin.

14. personal vechile - cycle - 15 (88%), moton - Bike - 4 (24%), 6%., Scooter - 1 (6%).

15. Amenities uses - Television - 4 (24%), Smart phone with internet - 12 (71%), Music system - 1 (6%).

16. public transport - bus (purulia - Ajodhya via Jikkabad).

17. Nearest health centre - Ajodhya Hilltop - 4km.

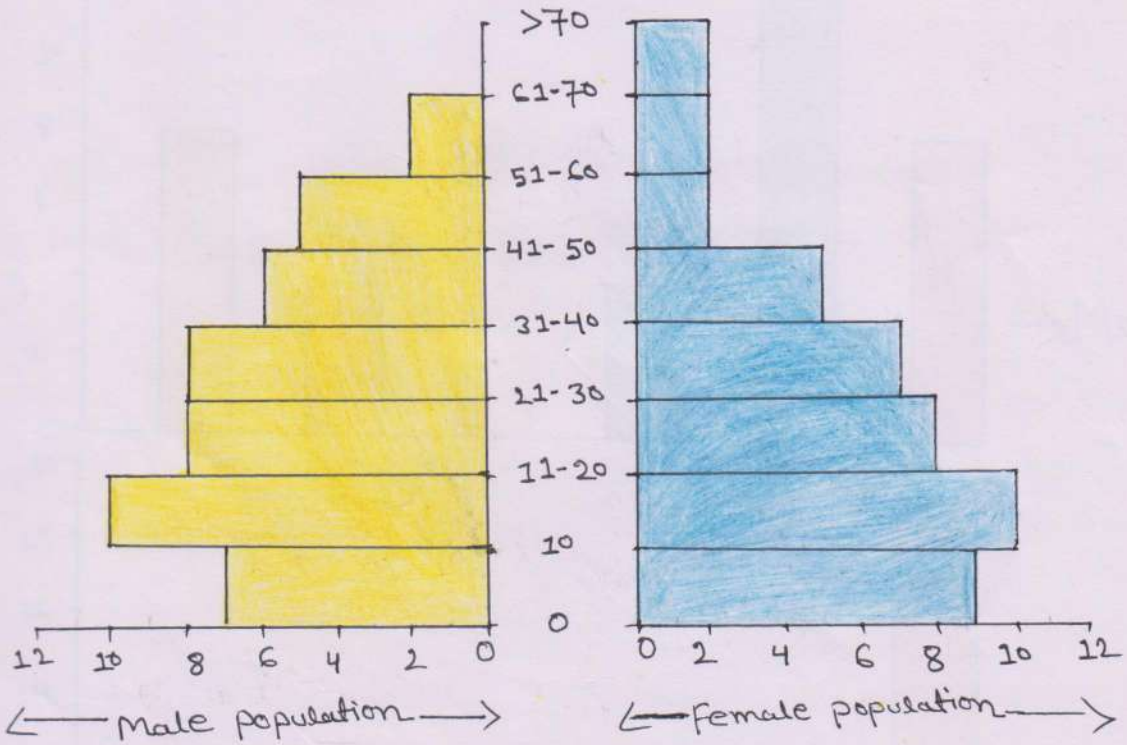
18. Primary School - yes.

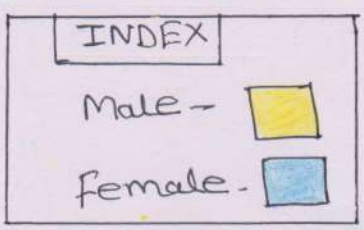
19. Hospital - Baghmundi.

20. personal Toilet - yes but most of them unused.

Different Age Group population of Lahadungni village

(As per Door To Door Survey)





Scale → Vertical Scale 1cm = 10 age population
→ Horizontal Scale 1cm = 2 population

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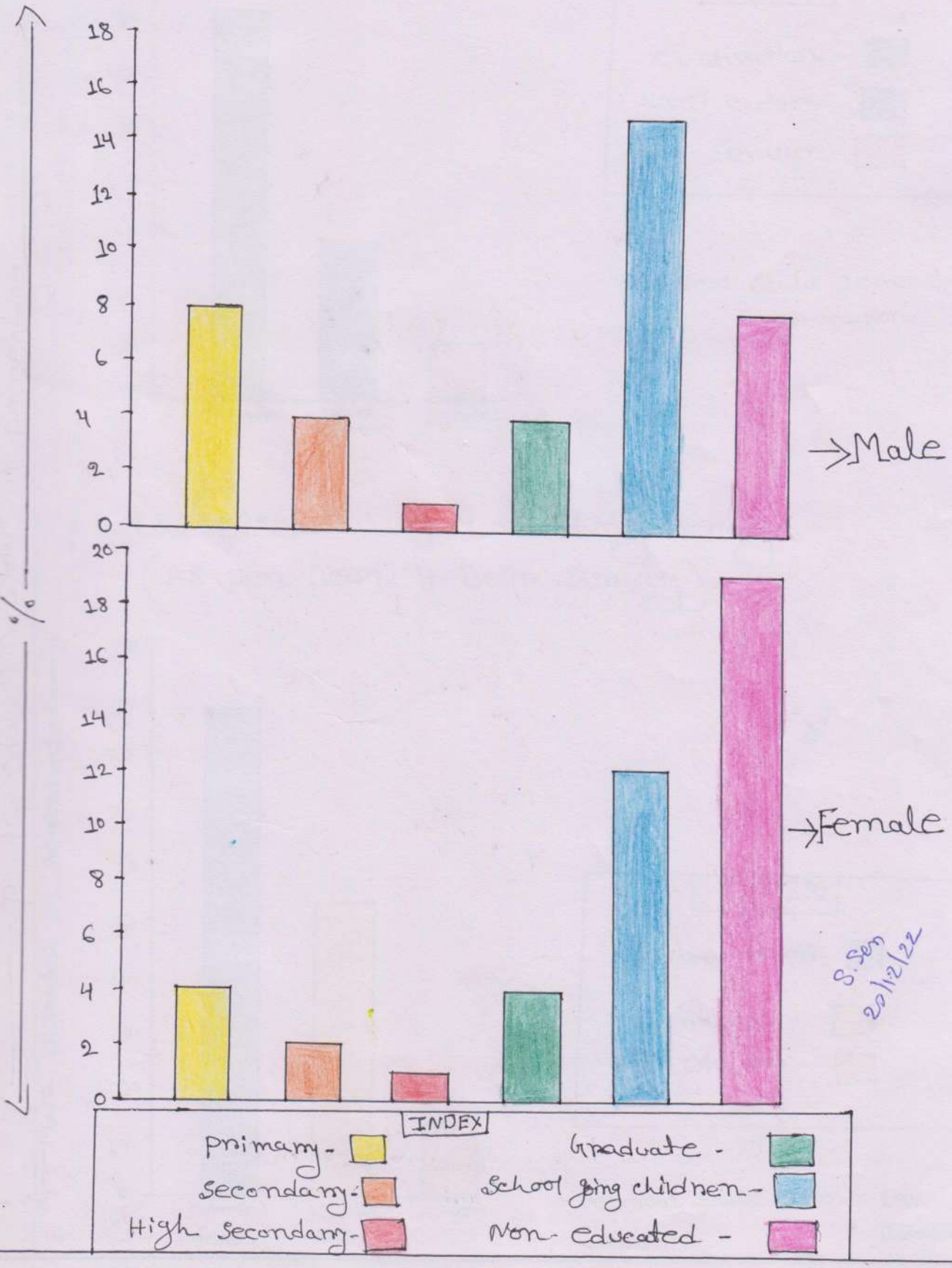
Education status of Lahadungri village
(As per Door To Door Survey)



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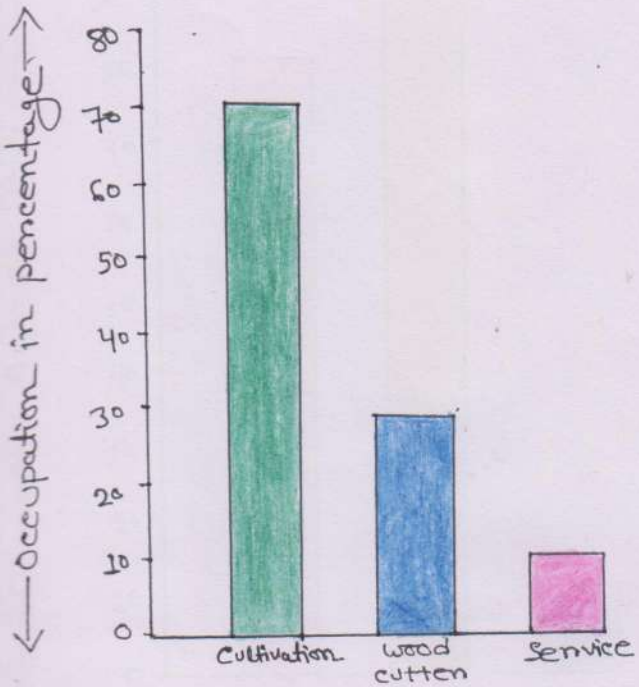
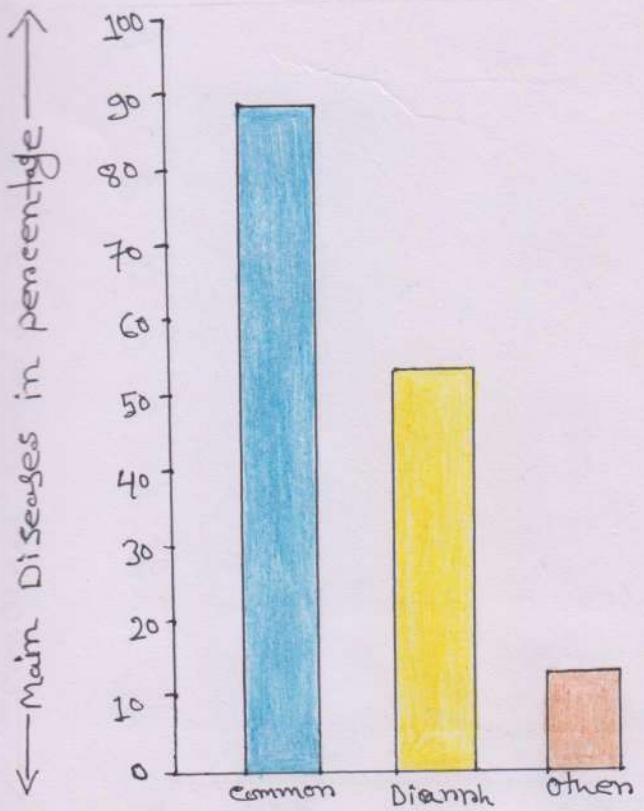
Occupational Status of Lahadungri Village
(As per Door To Door survey)



INDEX
- Cultivation -
- wood cutter -
- Service -

Vertical Scale 1cm = 10% Occupation

Main Diseases of Lahadungri Village
(As per Door To Door survey)



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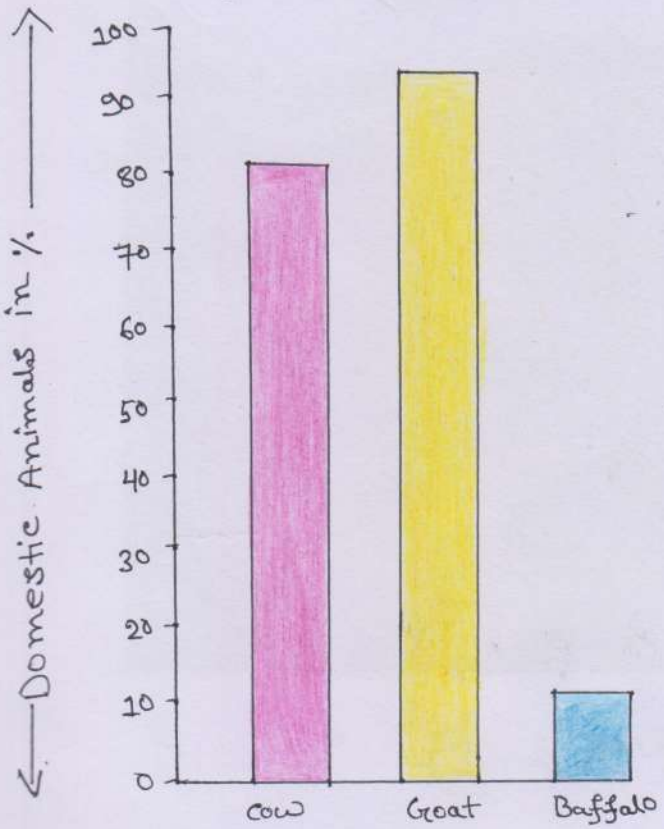
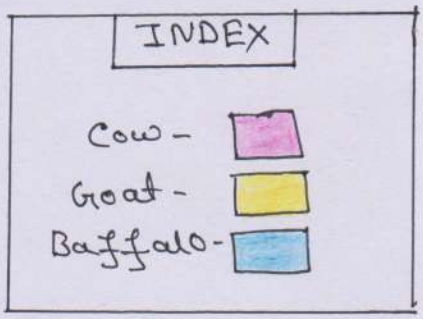
INDEX
- Common fever -
- Diarrhoea -
- Other -

Vertical Scale 1cm = 10% diseases.

Domestic Animals of Lahadungni Village
(As per Door To Door Survey)





vertical scale 1cm = 10%.

domestic Animals

personal vechiles of Lahadungni village
(As per Door To Door Survey)

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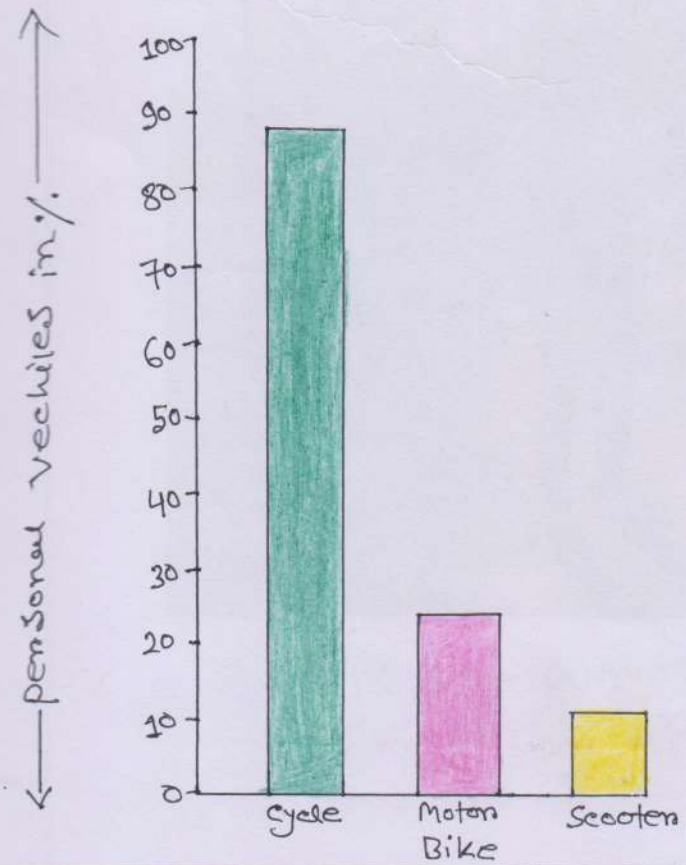
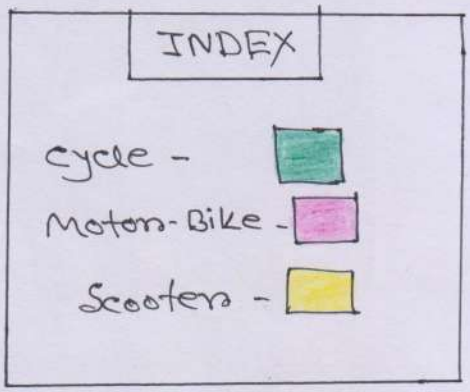




Vertical Scale 1cm = 10%.

personal vechiles

Fig: House Type

Fig: Doom Survey Team.

Socio-economic condition of chhatri village (As per 2011 census)

chhatri is a small village located on Sinkabad-Ajodhya road, 3km from Ajodhya hill top. Total area of this village is 3.65 km^2.

1. Total population - 823 (no of households - 165), population density - 225.47 km^2.
2. Male - 411 (49.93%), female - 412 (50.07%).
3. 0-6 age groups out of total population - 17.73%, of which male (out of total male) - 18.97% and femal (out of total female) - 20.87%.
4. Sex ratio - 1002.43.
5. All are ST population.
6. Literacy rate (total) - 22.96%.
7. Literacy rate (male) - 32.60%.
8. Literacy rate (female) - 13.34%.
9. Illiterates (total) - 77.04%.
10. Illiterates (male) - 67.40%.
11. Illiterates (female) - 86.66%.
12. Total worker out of total population - 55.16%.
13. Total male worker out of total male population - 54.25%.
14. Total female worker out of total female population - 56.06%.

15. Main workers out of total workers - 1.10%.

16. Male main workers out of total male workers - 100%.

17. Female main workers out of total female workers - 0%.

18. Among the four components of main workers, only agricultural labours and other workers are exist in this village. No cultivators and other industry workers.

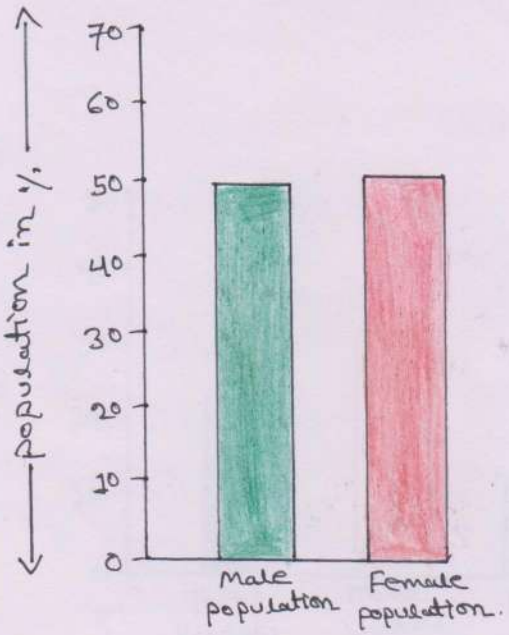
19. Agricultural labours out of total main workers 20%. (male - 100%, Female - 0%).

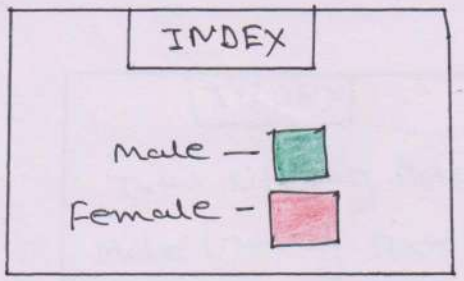
20. Other workers out of ~~this~~ total main workers - 80% (male - 100% and Female - %).

21. Marginal workers out of total workers - 99%. (male - 97.75%, Female - 100%).

22. Non-workers out of total population - 44.89%. (male - 45.74%, Female - 43.93%)

Population Characteristics of Chhatni village
(As per ~~Door to Census~~ survey)





Vertical Scale 1cm = 10% population.

0-6 Age Group percentage of Male & Female in Chhatni village
(As per ~~Door to~~ census survey)

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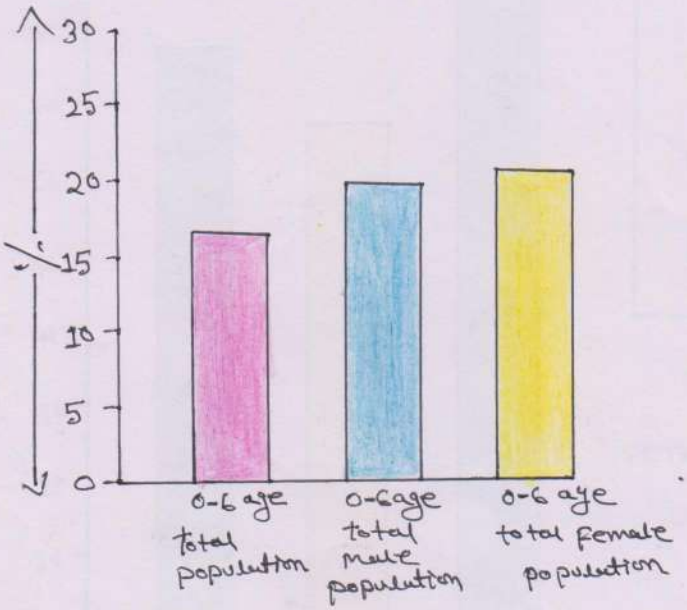
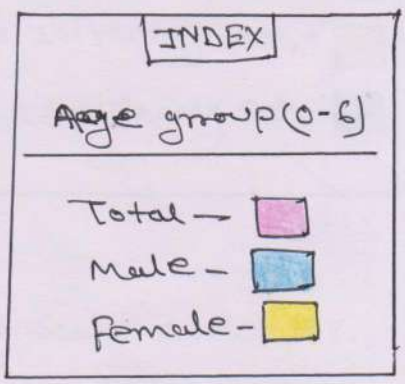
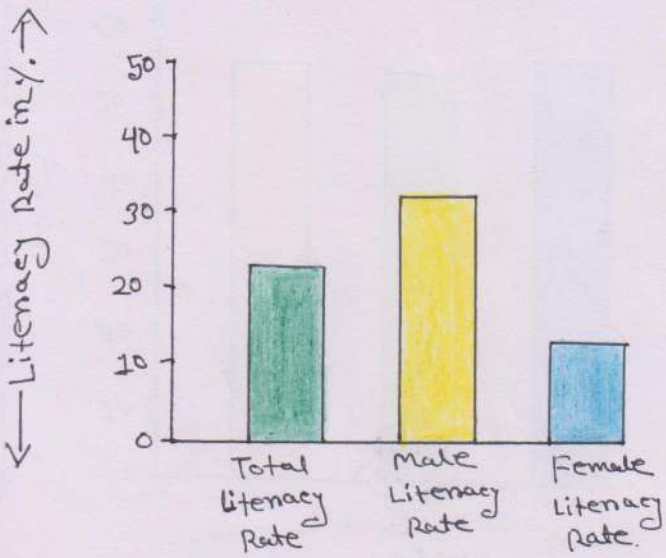




Literacy Rate of Chhatri village
(As per ~~Door to Door~~ census survey)



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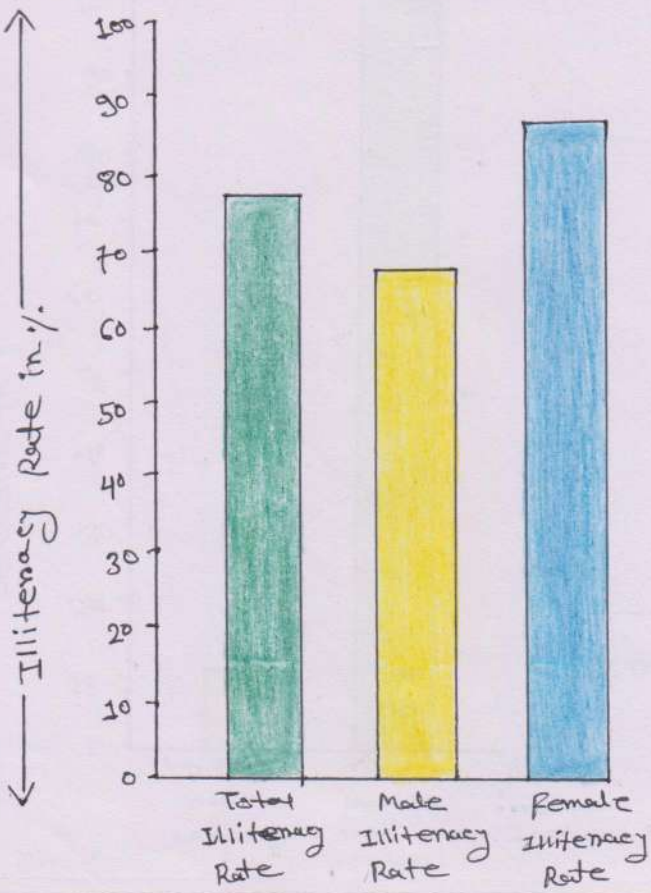
Total Literacy Rate-

Male Literacy Rate-

Female Literacy Rate-

Vertical Scale 1cm = 10% literacy.

Illiteracy Rate of Chhatri Village
(As per ~~Door to Door~~ census survey)



INDEX

Total Illiteracy Rate-

Male Illiteracy Rate-

Female Illiteracy Rate-

Vertical Scale 1cm = 10% Illiterates.

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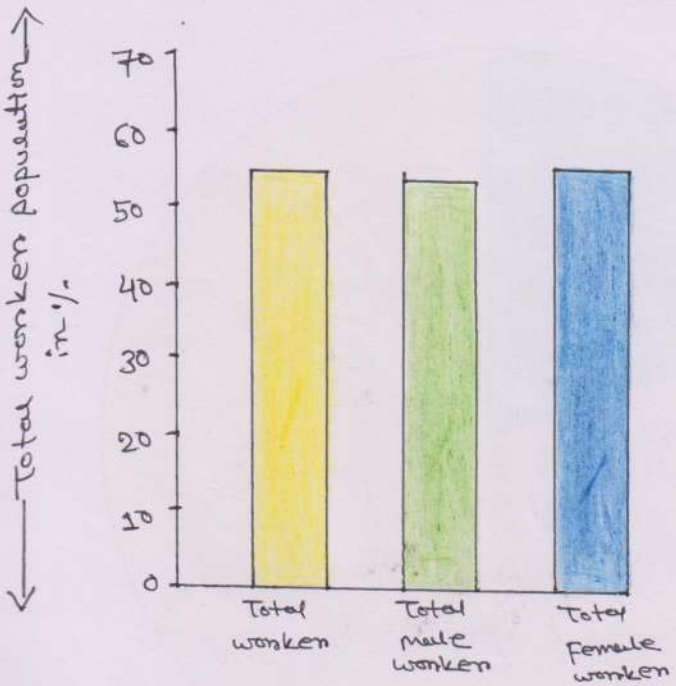
Occupational Status

Worker population Rate of Chhatri village (as per 2011 census)



INDEX

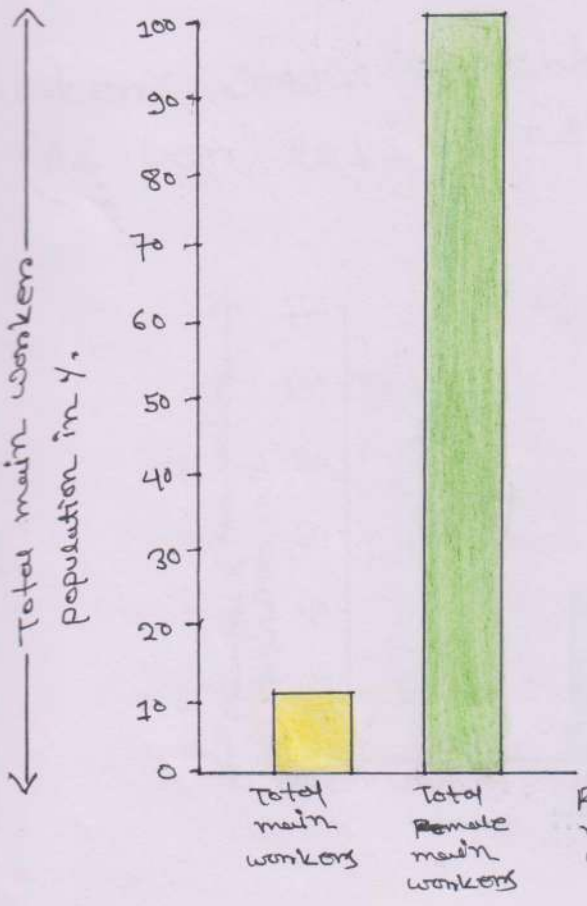
Total workers -

Total male workers -

Total female workers -

Vertical scale 1cm = 10% worker population.

Main worker population Rate of Chhatri village (as per 2011 census)



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Total main workers -

Total female main workers - 0%

Total male main workers.

Vertical scale 1cm = 10% main worker population.

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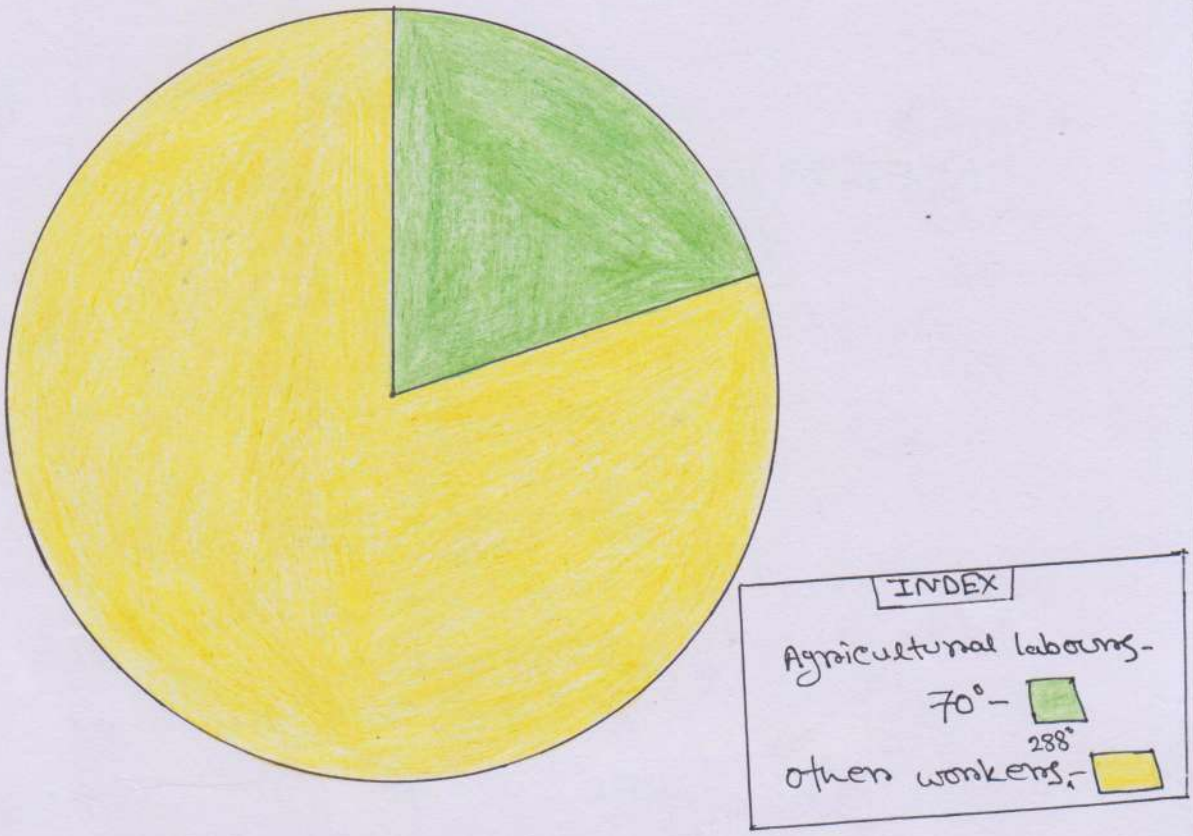
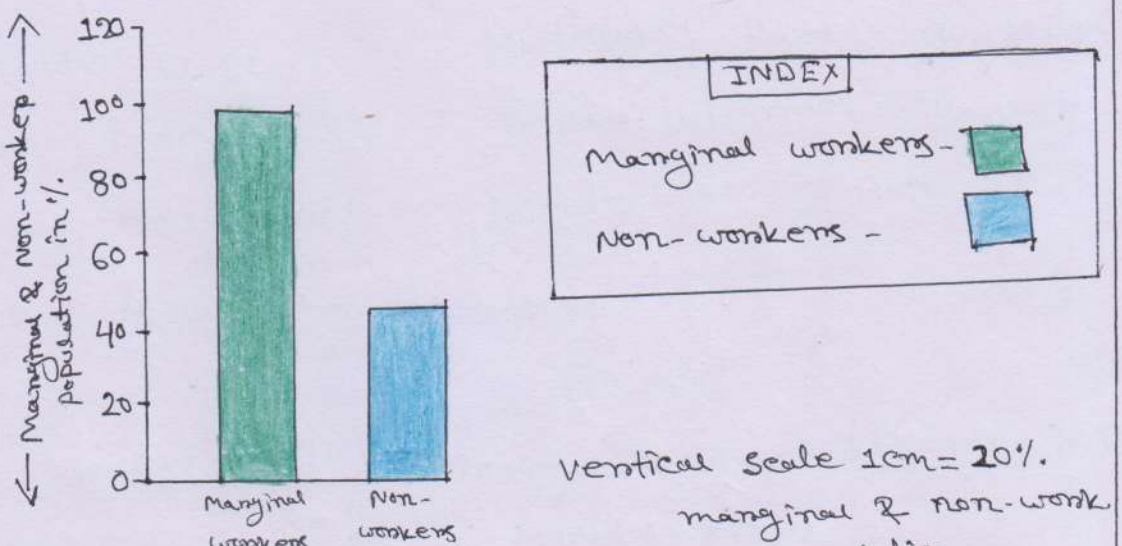
Workers status of Chhatni village
(As per 2011 census)



Workers status of Chhatni village
(As per 2011 census)

S. Sen 20/12/22



Socio-economic condition of Chhatni village as door to door Survey on 17.11.2022

1. No. of household Surveyed - 53
2. Male - 120 (47.43%), Female - 133 (52.57%)
3. ~~Average~~ Age group.

Male	Female
0-10 = 22	0-10 = 27
11-20 = 27	11-20 = 36
21-30 = 16	21-30 = 22
31-40 = 22	31-40 = 15
41-50 = 18	41-50 = 17
51-60 = 07	51-60 = 06
61-70 = 04	61-70 = 05
>70 = 04	>70 = 04

4. Educational Status.

Literacy Rate - 60.86%
Male Literacy Rate - 65%,
Female Literacy Rate - 42.85%,

Illiteracy Rate - 39.14%,
Male illiteracy Rate - 35%.
Female illiteracy Rate - 57.15%.

5. Different categories of Education:

Male	Female
Primary - 65, (42.20%) (male - 37.17%.)	Primary - 65 (42.20%) (Female - 47.36%)
Secondary - 19.48%. (male - 21.79%)	Female - 17.10%.
Higher Secondary - 11.03%. (male 12.82%.)	Female - 9.21%.

~~Male~~ Male Female

Graduate-(4.54%)- 6.41%, 2.63%

School going-(22.07%)- 20.51%, 23.68%

M.A.-(0.64%) - 1.28%, Nill

6. Occupation:
Cultivator - 84.90%, Agricultural Labourers - Nil,
Household workers - 1.88%, others workers - 15.09%.

7. Diseases: comonon fever - 83.01%, household.
Diarrhoea - 22.64%, household.
others - 9.43% "
none - 9.43% ".

Use of news paper - 11.32% "

8. Domestic animal: cow - 77.35% household
Goat - 84.90% houshold.
Buffalo - 1.88% houshold.
none - 7.54% household.

9. Drinking water: Tap water - 18.86% household.
Tube well - 67.92% household.
well - 13.20% household.

10. Structure of the house:
kachha - 88.67% household.
pakka - 11.33% household.

11. Use of Fuel: Wood - 100%.

Use of electricity - 100%.

12. ~~Anamini~~ Smart phone with internet 79.24%.

Television - 15.09%.

Music System - 1.88%.

13. personal vehicle -

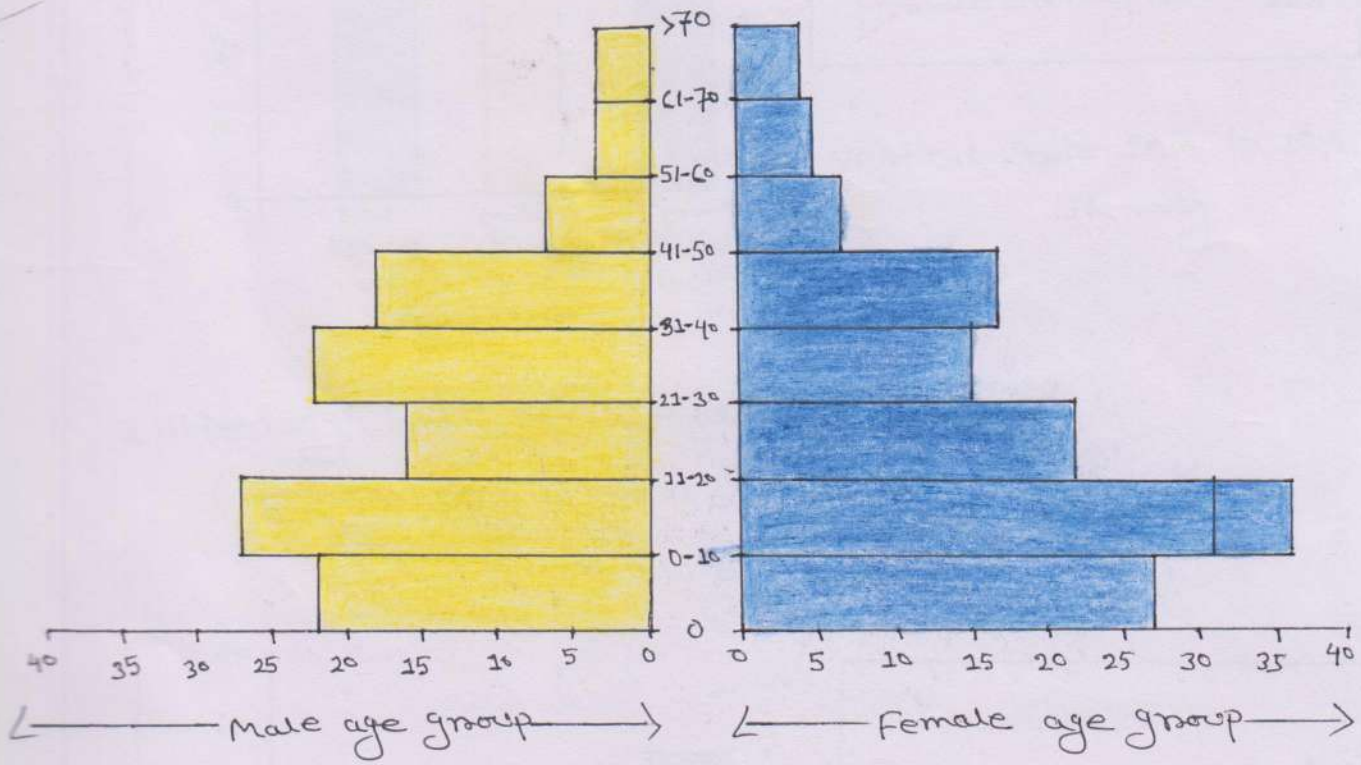
Cycle - 83.01 %.

Byke - 15.09 %.

Fig: Primary school of Chhatri village

Different Age Group population of Chhatri village

(As per Door To Door Survey)



INDEX

Male -

Female -

Scale — vertical Scale 1cm to 10 age population
Horizontal Scale 1cm to 5 population

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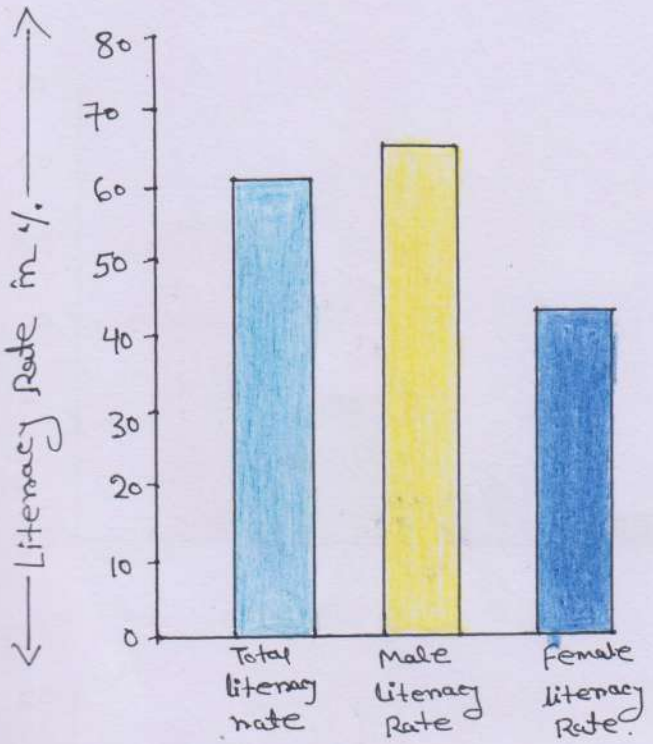
Literacy Rate of Chhatni Village
(As per Door To Door Survey)

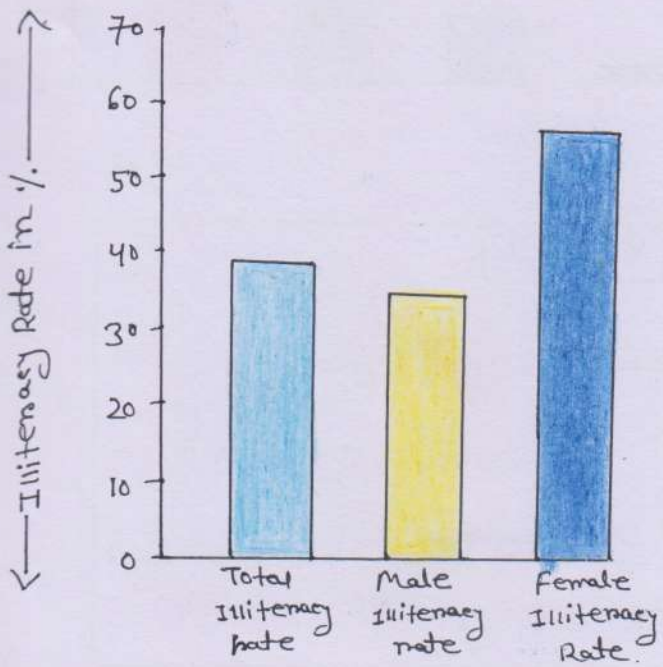


Total Literacy Rate-
Male Literacy Rate-
Female Literacy Rate-

Vertical Scale 1cm to 10% Literacy.

Illiteracy Rate of Chhatni Village
(As per Door To Door Survey)

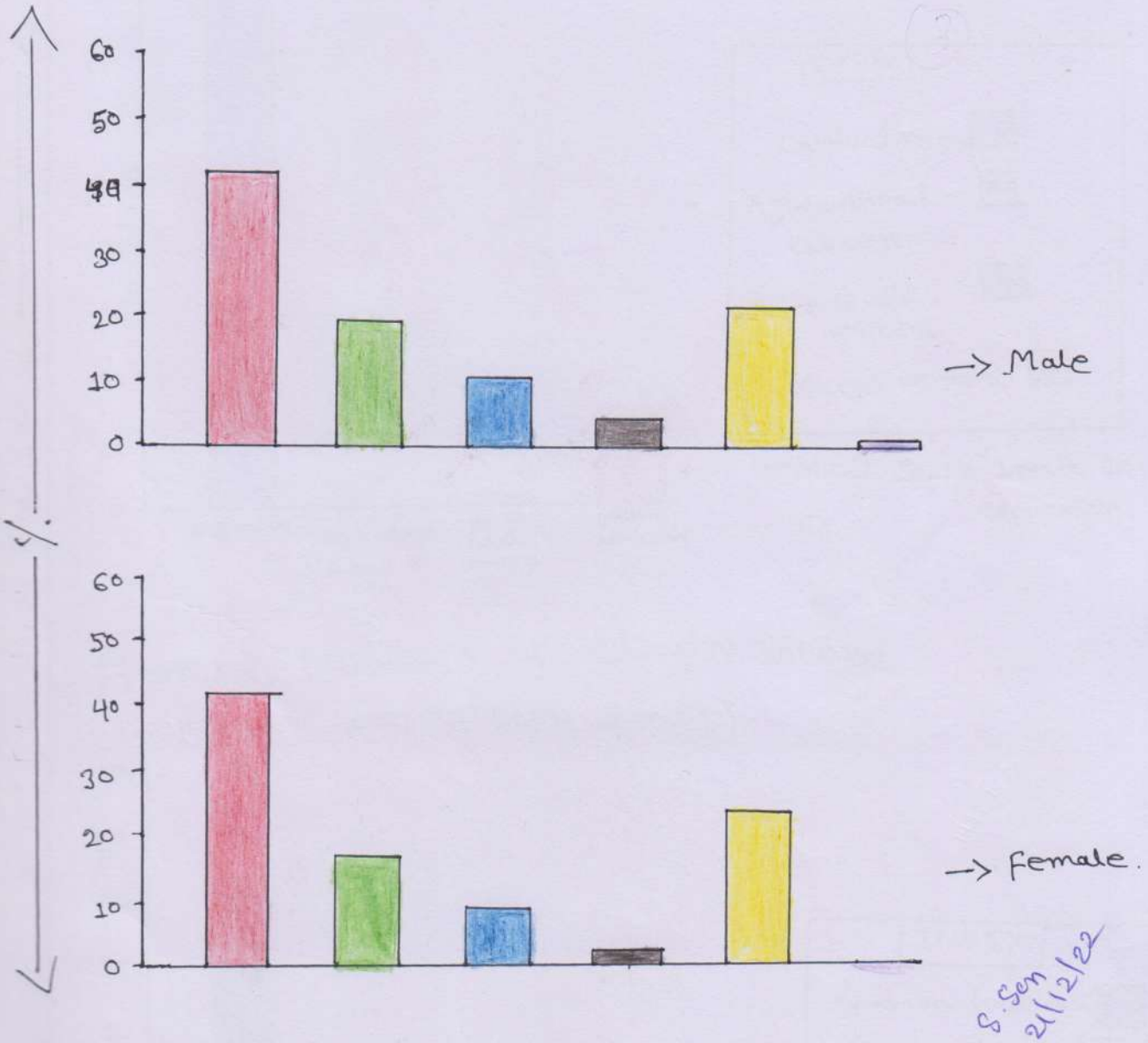
S. Sen 21/12/22



Total Illiterates Rate-
Male Illiterates Rate-
Female Illiterates Rate-

Vertical Scale 1cm to 10% Illiterates.

Education Status of Chhatri Village
(As per Door To Door Survey)



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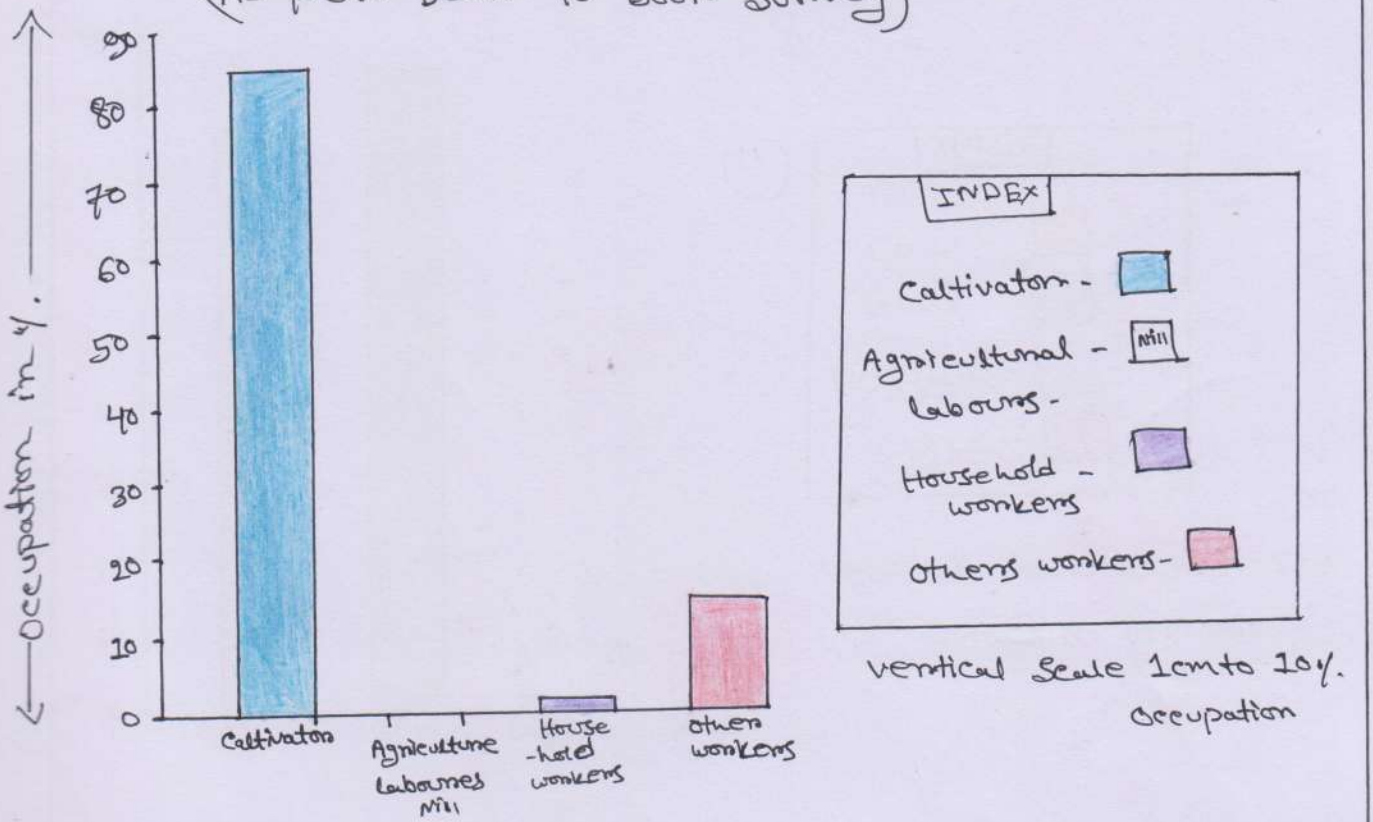
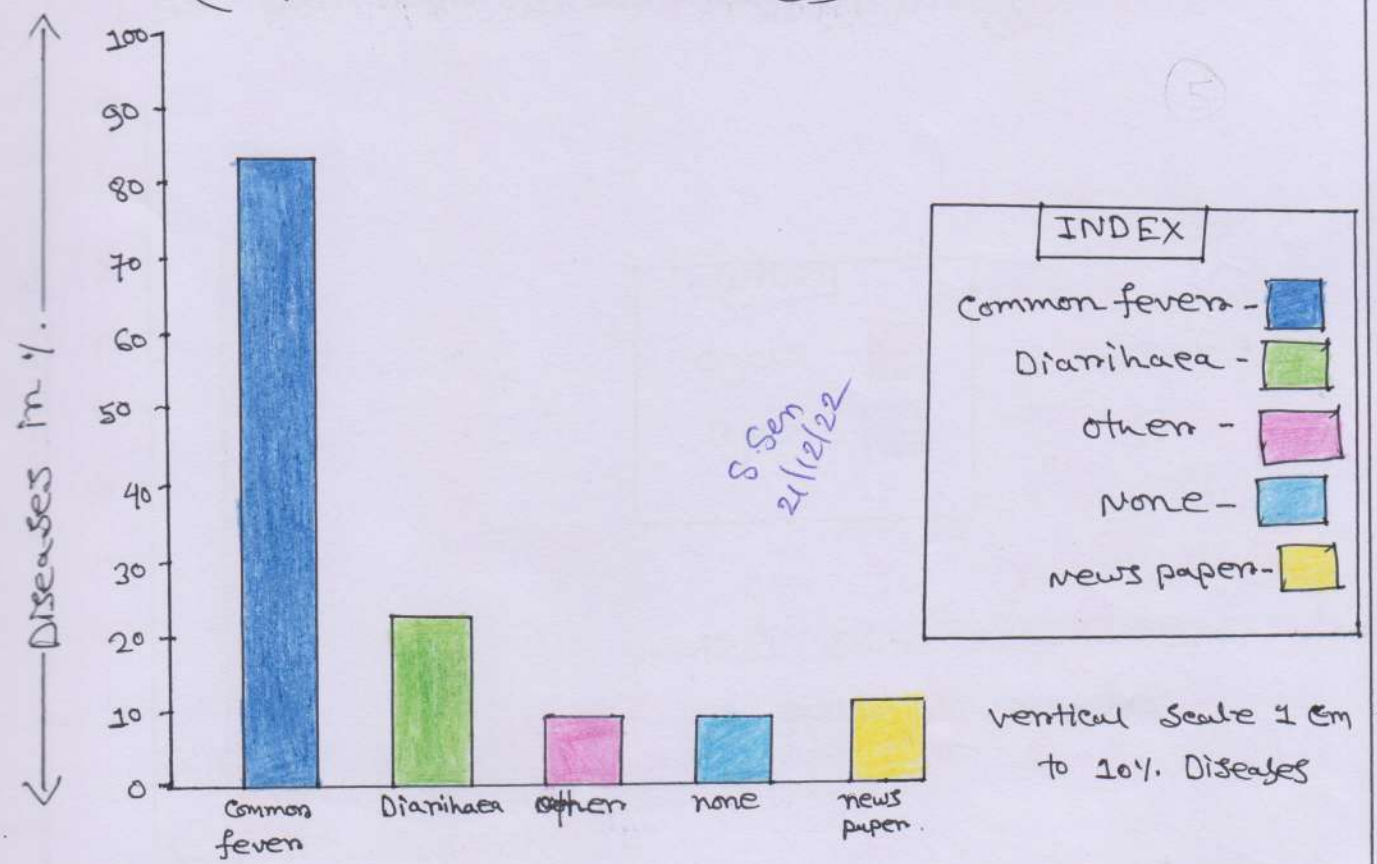
- primary -
- Secondary -
- High secondary -
- Graduate -
- School going children.
- Non-educated -

vertical scale 1 cm to 10% Education.

Occupational status of Chhatni Village
(As per Door To Door survey)



Different Diseases of Chhatni Village
(As per Door to Door survey)



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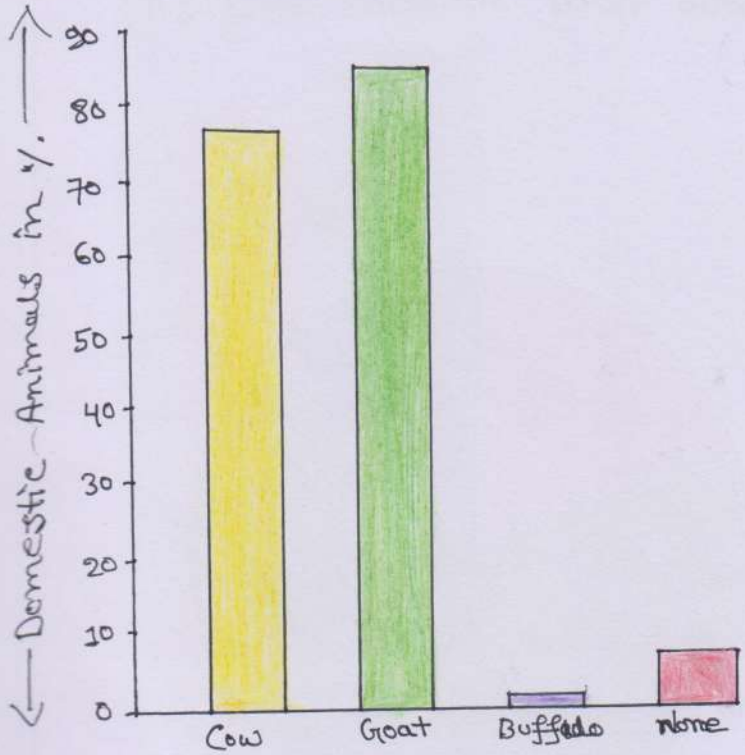
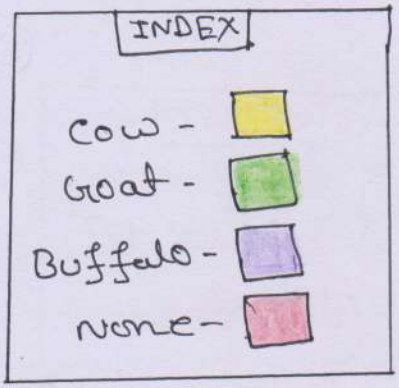
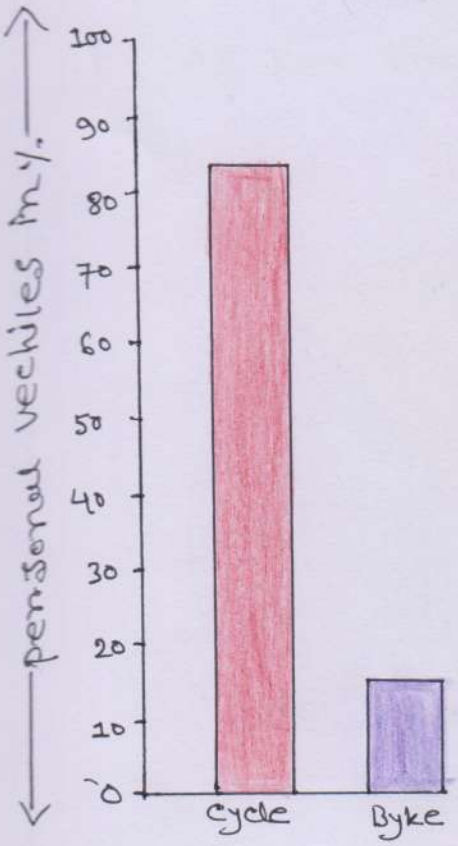
Domestic Animals of Chhatni Village
(As per Door To Door Survey)

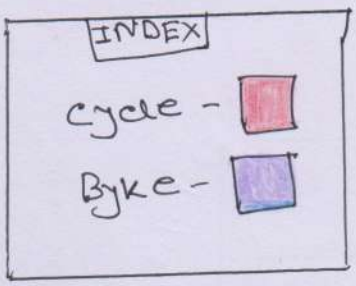




Vertical Scale 1 cm to 10%.
Domestic Animals.

personal vechiles of Chhatni village
(As per Door To Door Survey)





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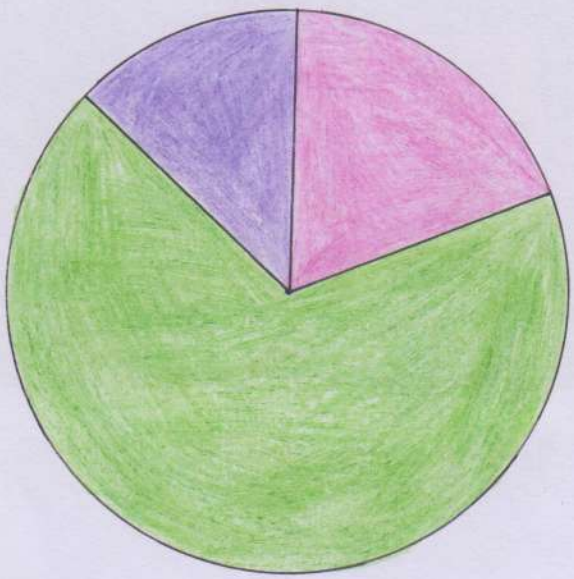
vertical Scale 1 cm to 10 %.
personal vechiles.

Drinking water of Chhatni village
(As per Door To Door Survey)



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Top water - 67.89' -

Tube well - 274.51' -

well - 47.52' -

House Structure of Chhatni village
(As per Door To Door Survey)

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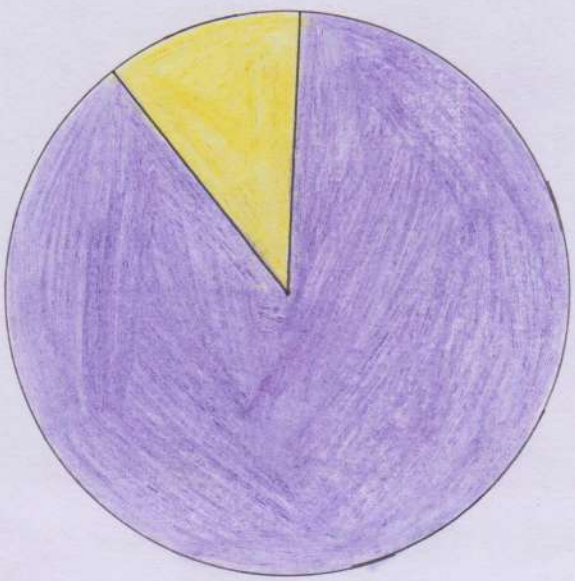

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kachha household - 319.21'

pukka household - 40.78'

Fig: Religious place of chhatni village.

Fig: Source of Drinking water (chhatni)

Concluding Remarks of Field Report:

- Both two villages, Lahadungri and Chhatni are located within the Ajodhya Hill region, just 3 to 4km from Ajodhya Hill Top on the way to Sinkabad.
- Both of these villages are small in size, 3 or 4km^2 in area.
- Literacy rate is moderate. Most of them are primary pass. Number of graduate people are too small. Female literacy is very low.
- population density of Lahadungri is low, but population density of chhatni is high.
- All peoples are scheduled tribe in category.
- physiographically, these two villages are located within the undulating terrain of Ajodhya (average height is 500m.).
- prevalent rocks are granite-gneiss.
- No rivers are found, except some rivulets.
- The main source of surface water pond.
- Soil cover is thin. Low in fertility status.
- cultivation is the main occupation, but cultivated lands are fragmented in nature.
- No forest cover is found in Lahadungri, but high forest area (more than 50%) is found in chhatni village.
- on the contary, net sown area is very high in Lahadungri, but low in chhatni village.

- Both of these village are economically backward.
- Most of people are cultivators and agricultural labourers.
- Fully brick made house (pakka) are very Few. Most of the house are made up of earthen wall with corrugated tin roof.
- Latrines are available in very few houses.
- cycles are common vehicle for each and every family, but some families are also used moton-cycle.
- More than 70% families are used smart phones.
- Electricity is available at each and every family.
- Drinking water is also available through locally installed deep tube well and overhead small storage tanks.
- Television are also available at very few houses.
- Average family income/month is low to very low.
- Medical facility available at Ajodhya Hill-Top, just 3 to 4 km ahead. Local PHC also available.
- primary schools are there, but high school are situated at Baghmundi and Sinkabad at least 15 km ahead. Nearest degree colleges are situated at Suisa and Balarampur (approximately 20 to 30 km).

THE END