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| Team Name | PreFlowd |
| Project Name | **Pre**diction and **Pre**vention of **Flo**od through pre-Flood **w**ater **d**iversion to water-crisis areas |
| Innovation statement | Strategic water diversion for foresighful solutions at diverse timescales and geographical locations |
| Report compiled by & with contributions from | All Team Members include:  Santanu Banerjee (MS Operations Research, IITKGP) Papia Das (MSc GeoInformatics, Adamas University) Ranajit Adhikari (Masters in GeoSpatial, Burdwan University) Manisha Baral (Assistant Professor, Adamas University) Kasturi Mukherjee (Associate Professor, Adamas University) |
| Reporting period | Till 1st August 2023 |
| Completion of the project in % (self-assessment) | One-third (Concept Validation and Initial Data Collection Done; Algorithm Development and Solution Validation pending) |
| Summary [350 words] | Ghatal subdivision in West Medinipur district under West Bengal is considered to be the most vulnerable place to tremendous flooding. The frequency and magnitude of floods in Ghatal subdivision has increased considerably with the changing time and the effects get worse on the lives of people residing there. Targeting to contribute to disaster management, the objective of this project is to develop a flood prediction and flow diversification algorithm which will help us to divert the pre flood water before entering into Ghatal. |
| Main outcomes/outputs/products | Temporal changes in the DEM required for preventing Floods (equivalent to opening of some canals for channelling away upstream water which could cause floods at downstream ends) |
| Objectives [Max 3] | Flood prevention  Flow diversification |
| Research questions [Max 3] | 1. Solving flooding problems within a basin should involve temporal solutions of intelligent flow channelling such that predicted flood water can be diverted earlier from upstream points into drought affected areas which may lie within other basins |
| Data table (Parameter/variable + Source + description) | We are to use spacio-temporal data for constraucting a Flood Prediction Algorithm (datssets discussed below) and alter some layers dynamically to sugegst possible solutions of the predicted events. |
| Methodology with a flowchart [Max 500 words] |  |
| Validation strategy [ 100 words] | Field Survey, Expert Analysis of the Algorithm suggested solutions, Implementation Feasibility |
| Activity completed [Max 3] | 1. Concept Development 2. Identification of closest Literatures which would help develop the PreFlowd Algorithm 3. Obtaining Datasets |
| Future activity [Maximum 3] | 1. Refining Datasets as per Model Requirement 2. Training of a Flood Prediction Model (with some benchmark accuracy) 3. Development of DEM+Stream altering algorithm for upstream water transfer 4. Iterating the suggested solution over the Flood Prediction Model to identify potential cascading effects of the suggested solution |
| Deliverables achieved | Literature Review and Initial Data Collection |
| Deliverables yet to be achieved. | Algorithm and Solutions |
| Challenges that you have encountered so far? | Dataset availability for the entire watershed. Referred paper (<https://doi.org/10.1080/10106049.2019.1687594>) for spatial flood prediction uses:   1. DEM 2. Curvature 3. Geology (Types of rocks) 4. Distance from River 5. SPI (Stream Power Index) 6. Rainfall 7. LULC (Land Use and Land Cover) 8. Soil Type 9. Topographic Wetness Index (TWI) 10. Slope   as the different layers for training their model. |
| Have you been able to overcome these challenges? If yes, how? If no, why? | We reduce our data requirements to the following dynamic spacio-temporal layers of our concerned Watershed:   1. DEM 2. LULC 3. Rainfall 4. Hydro-gauge (for safe and emergency levels of flows) 5. Drought Index 6. Stream Ordering   Other layers for the entire watershed may be fed later to improve accuracy and as per availability |
| Policy highlights (Max 2) [Max 75 words] | 1. Improving existing dadatsets (and accessibility) so that PreFlowd or better Algorithms can provide potential solutions to floods 2. Implementation of algorithmic solutions would require canal development and/or identification of natural basins for storages (to be dealt with in an extention of this challenge) |
| Similar solution (s) [provide a link if available] | The Paper: <https://doi.org/10.1029/2019WR025583> in their Fig: 1 mentions human intervention strategies; although implementations are yet to be developed (as per initial literature reviews). |
| Potential User(s) [Max 3] | Governments and Decision Makers |
| What decision can be taken from the outputs?  [ 100 words] | Infrastructure projects like canal and river-intelink development for (pre) flood water diversion. |