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Programme to Conserve the Urban Biodiversity of West Bengal with School Students

**Evaluation by
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11June, 2010

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Soumita Basu, PG Dip Journalism, has worked briefly as a broadcast journalist and has been involved with social research and documenting best practices in the development sector for several years

Sujit Sinha, Ph.D Chemistry, has been involved with alternative education and sustainable agriculture experiments in rural and urban areas for the last 20 years.

The Project

Diti Mookherjee, as Project Leader along with a team from ASED has been working on biodiversity conservation with school students of 4 schools in Kolkata, 1 in Howrah and 2 in Durgapur with funding support from Rufford Small Grant. This phase of the programme is 18 months long and follows two phases which were also funded by Rufford Small Grant under the name of “*Programme to conserve the urban biodiversity of Kolkata City with school students*” in October 2004 and “*Programme to conserve the urban biodiversity of West Bengal with school students*” in 2007.

Our main task was to evaluate the present phase of the programme by visiting the participating schools, discussing in details with the Core Group students and teachers, interviewing all the ASED staff members associated with the project, assessing the materials provided by the programme and attending the project sharing workshop. The evaluation was spread over a period of 2 months between 14th April and 10th June, 2010.

The main aim of this phase of the ASED programme was:

- a) Increasing awareness about biodiversity conservation in all the schools and especially the 2 schools in Durgapur by providing technical inputs. To increase biodiversity awareness among the people of Durgapur.
- b) Institutionalize the school projects for the 5 Kolkata schools since this is the third phase of intervention and start the withdrawal process so that the schools can continue with their own projects with minimum support from ASED.
- c) Promote networking among the 7 schools through e-mail, website and visiting each other’s school projects.
- d) Promote networking of the 7 schools with government and other agencies.

The evaluation looked at the following:

- A. Sensitization and Knowledge of biodiversity among the students
- B. Teaching Aids and Methods used
- C. The role of Teachers
- D. Specific activities related to biodiversity taken by the schools
- E. Integration of the programme within the school curriculum and routine
- F. Sharing and networking within and among the participating schools
- G. Larger networking and links with works of other agencies
- H. Increasing Awareness of the local people

Schools visited by the evaluation team are (**details attached as [Annexe 1](#)**):

1. Durgapur Taraknath High School, Durgapur
2. Metropolitan Institution (Main), Kolkata
3. Childrens’ Foundation School, Kolkata
4. Sarengabad Jajneshwari Pathshala Girls’ High School, Kolkata
5. Surendranath Girls School , Santragachi, Howrah
6. Ananda Ashram Girls High School , Kolkata

Note: One of the seven participating school, Sagarvanga Government Sponsored High School, Durgapur, have dropped out of the programme.

A. Sensitization and Knowledge of Bio diversity among the students

Achievements and Issues

The students of the core group and the teachers-in-charge have an understanding of what biodiversity means and the possible effects of losing this biodiversity. While interacting with the students it was seen that they were not restricted to memorised definitions of biodiversity as might be found in the text books. But they brought out the meaning as understood by them in their own words. Students of all the school could explain the relation between plants and their importance in human life

As expected, there was disparity in the levels of knowledge seen at the various schools (just like bio-diversity). Schools like Durgapur Taraknath High School, Metropolitan Institution (Main), Children's' Foundation School, Sarengabad Jajneshwari Pathshala Girls' High School had basic understanding of biodiversity and promptly talked about food chain while relating the importance of biodiversity. But they always also talked about oxygen levels in the air. Though students of Surendranath Girls School were also aware of the concept of biodiversity, they couldn't relate it with any example or any everyday issue. Ananda Ashram Girls High School, on the other hand, had commendable idea of bio diversity and could explain the concept with concrete examples of the importance of biodiversity linking it to pollination, soil conservation, water level conservation, crop diversity, etc. This level of knowledge in the students of Ananda Ashram Girls High School may be due to both ASED's efforts as well as the extensive work on various environment related issues the school is otherwise also known for. This school has once reached the national level and once the state level at the National Children's Science Congress. Also, in most schools, students were more focussed on the importance of plants and trees in the environment, while the role of the animals need more discussions. To some extent, there was the predictable confusion between overall Environmental issues and the issue of Biodiversity.

Our overall impression is that whatever ASED has done has got many children and some teachers excited about the issue of biodiversity ; and generally made them competent in observation , outdoor work, some hands on work, writing charts and displaying, making presentations, working in groups. So the ground is fertile to move to the next stage.

Recommendations for future:

The next step will be to broaden and deepen the concept of biodiversity and relate it more intimately to student's own life and environment. Then they can more actively start thinking of the need for conservation of biodiversity.

1. Introduce the diversity found within any one species. For example, different varieties of rice or potatoes or tomatoes or bananas or apples, food which the students can immediately relate to.
2. Talk of biodiversity in plants and animals influenced (both encouraged and discouraged) by humans. We humans have bred many kinds of plants as well as animals for particular characteristics. Mango is a very good example and so are domestic dogs. Such orientation will help the students think more deeply on the issue. *(Simple and enjoyable survey work can be given to students including some "research" to find out about particular varieties , what is so special , why they like them etc for both the above two points)*
3. Give specific real life examples on the consequences of the loss of biodiversity .This could also include the strong criticism of planting only eucalyptus in social forestry programmes for many years and its various ecological and social dimensions.
4. Orientation on biodiversity may also include issues and debates like genetic modification, BT cotton, BT brinjal, patenting life, etc. These are recent debates and are largely covered

by the media regularly. If the children can refer to such issues as part of their work, they will understand better and will be motivated towards 'finding out' more about such topics. *Dividing the class and asking them to argue both sides of the issue by collecting arguments from media can itself be a very enjoyable and learning activity.*

5. Extend orientation to practical ideas and practices of biodiversity conservation. Special emphasis may be given to traditional conservation practices, like that found in Kokkare Bellur. This shall also help the children appreciate traditional knowledge and practices, which they might be able to use as well.. This is particularly important because of the significance of 'local' specificities for biodiversity.

B. Teaching aid and methods used

Achievements and Issues:

The project has published a booklet on Biodiversity of West Bengal for the core groups. This book has some interesting information but the students found it too difficult to read, and it was even difficult to use by the teachers-in-charge.

The main learning methods used was an introductory slide show, exposure visits to hotspots like the Botanical Garden and walks around the neighbourhood of the school. The slide show was conducted by Kushal Mookherjee at the very beginning and students who were most motivated by the slide show became a member of the core group (up to 25 students). They played the game "web of life" to explain how whole of nature is interconnected and the destruction of one link can jeopardise the whole web. Children's' Foundation School has a nice song on biodiversity which they sing often in school.

Recommendations for future:

This aspect of the programme needs most amount of efforts in the future.

1. Use of stories, songs and poetry might be more effective for children to understand and internalise the concept of biodiversity. The stories may include the reports of consequences of biodiversity failing like in the case of the Great Irish Potato Famine (1740-1741), stories on endangered species, non availability of salt tolerant rice after cyclone AILA in Sundarbans or deep water rice after flooding and general loss of diversity of rice within India. Few stories on efforts towards biodiversity conservation, both traditional practices and current efforts that are being made. There is a nice catchy song on "saving" Kolkata by Anjan Dutta, although not specific to bio-diversity, which can be introduced. *In fact, students can be asked to write stories, poems and songs on bio-diversity and that can be quite an exciting activity and provide Teaching Aids for Biodiversity classes in future.*
2. The pedagogy: The form of orientation and sensitisation has to be more engaging and creative. Instead of only a lecture mode, more discussions and debates may be encouraged so that the students are also made to pro actively think about the issue. Hence the lesson plans should be made such that the children are able to engage in both actively 'doing' and actively 'thinking' about the process. *An example is given in [Annexe 2](#) which has some crucial pedagogic elements --- use of story which is always very attractive to children and they understand issues much better; the story has elements with which children are familiar; it is open ended so that children have to think and be creative; there can be multiple answers encouraging debate and discussion..* ASED can take the help of other resource organizations to develop such pedagogically interesting materials. And as mentioned above, the teachers and students can also get into the act of creating such open ended stories.
3. Manual: It can be very useful for the teachers if ASED could give a manual of various activities that can be done for biodiversity education. A very good one already exists ---

the Activity guide produced by National Children's Science Congress, India. The 15th National Science Children's congress 2007 was specifically on biodiversity. In fact discussing that manual, after giving it to all teachers, itself would provide a host of ideas to the schools. That manual is fortunately available in both English and Bengali.

4. Films may be used to raise awareness on biodiversity. Properly chosen they will be both entertaining and illuminating. And if worksheets can be given to make children do more thinking and creative activities and exercises related to the film, then there will be a greater impact on the students.

TERI has a few award winning films on biodiversity. More can be found at Centre for Environment Education (CEE), Centre for Media Studies (CMS), among others. There is a film on the traditional conservation of birds in village Kokra Bellur

5. Field Study Recording: Ananda Ashram Girls High School, Children's Foundation and Sarengabad Jajneswari Pathshala Girls' High School have specifically asked for training in field study methods and documentation. The teachers felt that learning this is very important. Some filled up field study tables should be provided to guide teachers and students
6. Games: Many students and schools wanted more use of games as teaching aid like the one used for "web of life".
7. Teaching Aids from Others: Ideas from various organisations and websites that discuss teaching learning materials can be surfed. There will be some teachers who are comfortable doing this. So a task force consisting of a person from ASED and some internet savvy interested teachers can be formed to do the necessary surfing, downloading. These will have to be translated and adapted as per local conditions Some of these sources are :

- a. Indian Journal of Environmental Education is a refereed journal, dedicated to the publication of researched articles in the field of environmental education and methodologies. This is published by C.P.R. Environmental Education Centre (CPREEC), a Centre of Excellence of the Ministry of Environment and Forests (MoEF), Government of India, established jointly by the Ministry and the C.P.Ramaswami Aiyar Foundation . This annual journal can be downloaded from (<http://cpreec.org/pubperiodicals-indjournal.htm>).
- b. There are many websites with a particular focus on helping teachers in the process of developing exemplary lesson plans : (http://www.hotchalk.com/index_new.html) and (<http://www.lessonplans.com/>) for teachers and student from kindergarten to class 12th.
- c. Activities and materials used and encouraged by North American Association for Environmental Education may be adapted for the West Bengal Schools. These can be downloaded from (<http://eelink.net/pages/EE+Activities+-+Biodiversity>)
- d. National Geographic has created an educator's guide. To observe 2010 as the International Year of Biodiversity, they have also made a few good teaching learning materials (TLM) for biodiversity in schools. The Educator's guide can be downloaded from National Geographic's website (<http://www.nationalgeographic.com/wildworld/pdf/educators.pdf>) along with other interesting IEC materials on their website (<http://www.nationalgeographic.com/wildworld/educators.html>).

If such interesting materials and lesson plans are tested and ready, many schools can be oriented and they can pick and choose what they would like to do. Then quite a few schools will be able to do it themselves with the minimal amount of encouragement and support.

C. The Role of Teachers

Achievements and Issues:

Some of the teachers are quite motivated and interested. Most, but not all, who are involved are geography teachers. In all schools, teachers felt that they should have got more intensive inputs separately from the Project Team. They were not satisfied with just being present when resource persons came and did something with the students, or just attending joint meets once a year where their students made some presentations.

Recommendations for future:

Increasing the capacity and empowerment of teachers is the most important task

1. A written concept note of the project should be ready in both English and Bengali to be given to all the teachers and principals getting involved. Care should be taken to give this to any new teacher getting involved as sometimes, teachers do change.
2. In any future project, the first event should be a separate orientation for teachers involved. Here the concepts, project ideas, past experience should be shared with them. They should be given enough space to think and come up with their own questions and ideas. And also be involved in planning the whole project to give them a sense of ownership.
3. Such events for teacher's experience sharing and brainstorming should be held every three months.
4. See also D below for lesson planning workshop with teachers.
5. Teachers involved should be facilitated to exchange telephone numbers, emails (if they have), and regularly interact with each other.
6. Teachers should also be "allowed" to call ASED directly, instead of going through Heads, in case of any need or clarification.
7. If possible the quarterly meeting should be held in a separate school by rotation so that everyone gets to see the work done by other schools, and there is some kind of peer monitoring.
8. Research, innovations have to be encouraged; those who can do internet search have to be facilitated to do so.

D. Activities done by the schools

All the schools made a presentation of their work at the project sharing workshop at Birla Planetarium on the 22nd of April, 2010. All of them had made charts which had names of a few plants and animals, their scientific names, phylum, class, family, and sometimes, their characteristics including medicinal and other use.

Most of the animals mentioned were the common ones like dog, cat, cow, crow, mosquito, fly, which the students are already familiar with. This was good as it meant children with help of teachers had to go and find out these things and would probably need some "reference work". Metropolitan Institution (Main) also made a Herbarium. The plants catalogued were also only few of the local species found. Just cataloguing the common plants and animals can be a starting point which may soon be made into an exhaustive cataloguing of school and neighbouring plants and animals. This would add more value to the work. The students might also come across many unfamiliar species and would involve much more investigation, observation, recording, reference work, asking knowledge centres like ASED and Biodiversity Board. For example, an organisation has already catalogued all the trees in the Southern Avenue area of Kolkata. Taking an initiative, Ananda Ashram Girls High School had plans to label all the trees with their common and scientific name in their locality from World Environment Day on 5th June this year.

Sarengabad Jajneshwari Pathshala Girls' High School did an interesting project on conserving *Water Monitor Lizard* (*Varanus salvator* / go-shap), a reptile found in Bengal which is now one of the endangered species. They designed and conducted a water monitoring project in and around a new high rise residential complex in the locality. They observed all the water animals, specially the Go-Shap - their eating habits, how many they are in number, their daily routine, etc. The students drew maps before and after the residential complex was built, and sent the before-after map to the Department of Environment, who in turn sent it to State Biodiversity Board . The people from the residential complex and the Board sat together to discuss how the building was detrimental to the biodiversity conservation of the area, especially for the already endangered Go-Shap. After a lot of discussion and brainstorming, a space for bio conservation within the residential complex was created. This space was kept untouched by the residents of the complex and this created a liveable environment for the Go-Shap.

Ananda Ashram Girls High School worked on biodiversity within the school campus. They also planted a gourd flower and observed its growth carefully, trying to save it from various natural problems as well as from other students of the school who maybe tempted to pluck it. They started a garden in the school and also encouraged students to have one at home, especially of herbal medicines. As part of biodiversity survey, they made a map of the school, mapped the greenery, location of trees and the concrete parts, and wrote the scientific names of the trees. They later improvised on this project on their own and identified all the trees on NSC Road, where on NSC Road are they, which tree attracts more animals/birds, recorded the difference between such bio diversity on the main road and in the lanes. NSC Road is one of the longest roads in Kolkata, on which the school is situated.

Surendranath Girls School observed the life circle of butterfly, planted trees and plants at school and at home, especially of herbal medicines. They also did an interesting project of preparing organic manure by using worms.

Recommendations for future:

1. Making maps has to be encouraged as the 3 schools who did this found maps to be very useful in learning about their local biodiversity. The students had fun while making it and these maps could be referred to for many other projects as well, which was very motivating for the students.
2. ASED can help the schools to make an exhaustive list of all the plants and animals in their locality, instead of recording a few already known ones.
3. Apart from only cataloguing, making a neighbourhood tree map may be useful, specially where trees are quite scarce and might be cut down for "development" like around Metropolitan Institution (Main).
4. Documenting "what changes have taken place with respect to Biodiversity in the locality" can be quite interesting for the students. The primary method of data collection can be interviewing few old residents of the locality. This is fun and hones various skills.
5. There will be a better impact on learning if the children are encouraged to identify specific local problems or threats to biodiversity. Based on this, if possible, they can also initiate some "action". From the work by Sarengabad Jajneshwari Pathshala Girls' High School on "go shap", it can be seen that children have been more engaged in the issue by such activity and have also been more motivated than others.
6. All the schools suggested that ASED should take more regular feedback on their project and see the impact. There can be a quarterly review of the work. For this purpose, ASED can also give some kind of worksheet/evaluation sheet to the teachers. These will help them

- a. To see if there is an increase in awareness in the students.
 - b. To identify the project gaps. Evaluate ASED's working methods, worksheets, etc.
 - c. In motivating the children.
7. The students and maybe many teachers were too focused on scientific names. But that was not at all the purpose of ASED's intervention. So in future ASED has to be careful of schools attaching undue importance to certain facts –issues.
 8. All the school asked for more project ideas from ASED. *As mentioned in B3 above, the "15th National Science Children's Congress 2007 manual" is full of ideas and should be obtained and circulated in future.*

E. Integration of the programme within the school curriculum and routine

Achievements and Issues

Principal of Ananda Ashram Girls High School explained how they have such a rich background of environment education in their school, "We teach according to the EVS syllabus. We try to adapt all the projects, including ASED projects within the fold of the EVS syllabus. This way the project doesn't demand more time and is a part of the curriculum."

Teachers of most schools visited, voiced similar opinion that the programme will be much more effective if it is integrated with the syllabus. It will be more helpful for the students for their studies as they will be able to better relate to the textbooks while doing the practical work and vice versa.

The other advantage would be that understanding "biodiversity" through activities will not remain a special focus for a specific core group, but everyone will participate in knowing and acting on one of the most crucial issues for our existence today .

This integration sounds easy, but none of the other schools have been able to do such a smooth job.

Recommendations for future:

It is extremely important that ASED, in a joint workshop with teachers, identifies all the chapters of all subjects to see where "bio-diversity" is already mentioned or there is a scope for introducing the various concepts of "bio-diversity". Then utilize that opportunity to bring in the related lesson plan, materials and activities. This will require an intensive workshop of 5-6 days broken into several instalments of 1, 2, 3 days . Ideally there should be a follow up workshop of 3 days after a year of trying out these lesson plans to do appropriate modification. But ASED should also involve experts in pedagogy, material development like DRCS, Shikshamitra in these workshops. Fitting things into the school routine is not such an easy matter because of various constraints but once that is done, the chances of widespread replication increases dramatically.

[Annexe 3](#) gives few examples of the chapters in the textbooks of class 7 and 8 of West Bengal School where there is scope of such integration, although bio-diversity is not specifically mentioned. This term has been used in Environment books of Classes IX – XII.

F. Sharing and networking within and among the participating schools

The main form of sharing has been the annual fair or workshops where the schools present their projects. However, due to limited time the schools cannot get into an in depth discussions, debates on recent issues or brainstorm over any project idea.

Recommendation:

1. Schools should be encouraged to visit one another and their project sites. Students of Children's Foundation expressed an interest to the evaluation team and to their principal to go and see the work of Sarengabad Jajneshwari Pathshala Girls' High School. ASED may help them plan and schedule such a visit.

Dissemination of the knowledge on biodiversity is generally seen to be restricted within the core group. Children have been sharing with their classmates and friends who are interested. Such informal sharing by students are also only restricted to their classmates and few chosen friends. Better sharing is seen where the core groups have been able to use the platform of the Eco clubs of their school.

Recommendations:

1. Use of news boards: Children should be encouraged to keep a news board at a common place in the school. They should collect news items on biodiversity from various sources. This can be interesting for the students and also raise awareness of all the students beyond the core group. To initiate this, ASED might themselves have to supply the news items from various sources for a few months till the students get hooked and feel interested enough to do it themselves.
 - a) A good source of news is a site maintained by CSE on environment, with a special section on biodiversity that is collected from over 15 national dailies (<http://indiaenvironmentportal.org.in/taxonomy/term/3486?page=1>)
 - b) Newsletter of "India Together" can also be a good source. They have a special section on biodiversity under environment page. (<http://www.indiatogether.org/environment/biodiv.htm>).
2. Documentation of the learning from this programme across all the phases has been suggested by Ananda Ashram Girls High School. They also suggested that ASED can publish a booklet detailing all the projects taken up by the participating schools. This will help the schools to replicate the work in the future. It can also be used as resource material for other schools and can be a good tool for sharing. If a certain school project is very interesting it can also be video documented for future reference, sharing among schools and also in other schools outside the purview of the programme where it can act as a good IEC material.
3. Filming ASED's slide presentation on Biodiversity in West Bengal given by Kushal Mookherjee can be a good IEC resource for any school introducing biodiversity to their students.

G. Larger networking and links with works of other agencies

Achievements and Issues

It is now well recognised that biodiversity is one of most crucial issues for the coming generation. Therefore, effort to start children thinking about the issue as early as possible is important. For ASED to play an effective role in this spreading of biodiversity education, they must *have widespread collaborations with many agencies*. ASED is already linked to State Biodiversity Board. And this Board has collaborated in the Go-Shap project done by Sarengabad Jajneshwari Pathshala Girls' High School. ASED is also quite linked with the NGO DRCS specialising in environmental education. In three of the schools, namely, Metropolitan Institution, Children's Foundation and Ananda Ashram Girl's High School, both

ASED and DRCSC have intervened since April 2008. There could have been more collaboration with DRCSC on actual lesson planning and materials. ASED is already quite closely linked with WWF.

Recommendations for future:

1. Collaborations with Kolkata based NGOs DRCSC, Shikshamitra and others to develop lessons and materials (and evaluations) as already mentioned in Section D above (along with school teachers).
2. Provide crucial inputs based on own experiments, lessons, materials to agencies which are responsible for eco-clubs in various schools, specially Paschim Banga Vigyan Mancha .
3. Develop links with SCERT who are responsible for syllabus and teachers training of all government schools.
4. Strengthen relations with State Biodiversity Board as to an extent their mandate overlaps with this project. See below

West Bengal State Biodiversity Board, <http://wbbb.gov.in/activities.html>

* Conducting biodiversity related workshops for different target groups viz., school, college and university students, teachers, researchers, scientists, policy makers, BMC members, industries, farmers, breeders, holders and creators of indigenous and traditional knowledge.

* Publications on Biodiversity of the State: The Board has published a number of books, booklets, pamphlets, brochures and posters for communicating various biodiversity information and messages for the common people, school, college and university students and the scientific community

This is the project list of the bio diversity board:

<http://wbbb.gov.in/projects.html>

* The project “Conservation & documentation of wild biodiversity in Bethune College Campus (2009-10)” can be explored to see if it can be adapted for schools.

* The project “Diversity, Distribution & Ecology of Butterfly communities of West Bengal” may be used for training purposes.

5. Network with similar projects across India to exchange ideas and collaborate.
 - a) Join UNDP solution exchange on environment and school education to get an idea of what is happening all over the country and then get linked to some of the institutions doing similar work. (See <http://www.solutionexchange-un.net.in/se.html>)
 - b) The GEF Small Grants Programme (SGP) has over 131 projects on biodiversity across India since 2001 (<http://www.sgpindia.org/Thematic-area-wise-projects.html>). An outline of one of the GEF SGP project is given below.

Manav Sadan Vikas Sanstha (MSVS), Mumbai, Maharashtra

“Promoting Local response for Biodiversity Conservation through Establishment of “Centers of learning” in secondary schools of Ratnagiri & Sindhudurg districts of Maharashtra”

Grant Amount: Rs. 8, 00,000

The goal and purpose of the project is to promote local response for the demonstration of conserving biological diversity through involvement of school children. The project proposes to promote local response of the school children for conserving the natural resources of Ratnagiri and Sindhudurg District, to involve various techniques, such as survey of flora and fauna of the regions, demonstrate the conservation of ecologically important (endangered species) plants through establishment of gardens of medicinal plants in and around the schools and create public awareness through formal and non formal methods among various strata of the society, about the importance of environmental protection.

6. Have more active links with nodal agency Centre for Environmental Education (CEE), Ahmedabad. They are running a diploma programme for teachers in Environmental Education. (See http://www.greenteacher.org/?page_id=110)
7. Maintain links with WWF India .They are observing the International Year for Biodiversity - 2010. There are options of sharing pictures. Children can send in pictures of their work (definitely efforts like Sarengabad) and be published by WWF. They would carry credits every time the picture is used. (See http://www.wffindia.org/about_wwf/)
8. This linking up and then maintaining those links should not be the exclusive task of ASED staff. There should be a teacher’s group which will gradually take over this responsibility. This is quite crucial as otherwise ASED will be totally overwhelmed.

H. Increasing Awareness of the Local people

Students of Ananda Ashram held an awareness programme where they invited the parents and local people and shopkeepers during the Environmental week in 2008.

Sarengabad Jajneswari Pathshala Girls’ High School took a lot of information on the locals while collecting data for their project. This process helped the students to increase their awareness levels by building a relation with the locals.

Recommendations:

1. A student from Children’s’ Foundation also thought of starting a neighbourhood group with friends around their home and explore the area, find out about the local plants/animals, know more about them.
2. Local people may be involved while doing the “historical change in biodiversity” survey

Annexe 1

Evaluation Visits schedule

Name of Place visited	Date and time of Visit	Persons met
ASED, Kolkata office	16 April 2010	Diti Mukherjee, Kushal Mukherjee, Indrajit Mullick, Susmita Basu
Durgapur Taraknath High School, Durgapur	19 April 2010,	In separate discussions with; Tarun Kumar Panja (Geography), Principal. And 25 students of the core group (all boys)
Birla Planetarium	22 April 2010, 11 am-3pm	To attend the sharing workshop
Surendranath Girls School, Satragachi	26 April 2010, 3.05–4.05 pm	Joint interaction held with teachers in charge, Manjulika Naskar (Pure science teacher); Nandita Chakraborty (Arts teacher), and 50 members of the core group
Sarengabad Jajneswari Pathshala Girls' High School, Kolkata	03 May 2010, 2.05–3.05 pm	Joint interaction held with Teachers in charge of the core group is Sanghamitra Majumder (Geography teacher), Kamalika Ghosh (Geography teacher) and Moly Roy (Life science teacher) and 23 students from the core group.
Children's Foundation School, Kolkata	04 May 2010 10.30 am – 12.10 pm	Joint interaction with teacher in charge Chhabi Sinha (Biology teacher), Sutapa Chakraborty (Principal) and all ten present core group members – 5 girls and 5 boys.
Ananda Ashram Girl High School, Kolkata	05 May 2010, 2.30–3.45 pm	In two simultaneous discussions with the teachers and students: Sushmita Mukherjee, core group in charge (English teacher), Krishna Banerjee (Geography teacher), Sharmistha Bhattacharya (Principal) 12 students from the core group
Metropolitan Institution (Main), Kolkata	20 May 2010 2–4 pm	Joint interaction with teachers in charge Subhrakanti Roy (Life Science & education since beginning), Swapan Kumar Ghosh (Chemistry) and 10 of the 12 students (boys) of current core group.
ASED, Kolkata office	26 May 2010, 3-5 pm	Diti Mukherjee, Kushal Mukherjee, Indrajit Mullick, Susmita Basu for more information and sharing of evaluation results till then.

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Annexe 2:

For example, the concept of variety and diversity within a particular species, and the consequences of such biodiversity failing can be explained thus,

It was around seven in the morning and the market of Kokilpur village was bustling with activity. People are selling all different kinds of fruit and vegetables – lush green spinach and bright red tomatoes! And giving them company sits potatoes and papaya and pumpkin. In the middle sits the rice family. They are many many kinds. The rice family is very interesting – they all look quite different from one another! Some are small, some are thin and some looking brighter than the others. And they all had a different kind of special quality about them that no one else had and all of them also had a special friendship with different people. Like, if you asked the farmers, they would tell you how one member of the family were friends with rain, and even if there is rain and flood, this member of the rice family would always be safe, and another member was especially friendly with salt. This way each member enjoyed a unique special friendship.

Like many others in the village, Ravi used to grow many such members of the rice family and sell them in the village main market. One day, a greedy businessman from the town came and told Ravi that if he left this family of rice and instead start growing one kind of rice which no one knew about, it was not found naturally in the area and the businessman made it in his lab through an experiment.

Ravi was very confused. He didn't know what to do. He was a poor farmer and earning triple the money will help him send his son and daughter to a good school. Also, he can buy good clothes and food for them, which he can't now. It was difficult for Ravi to decide. Ravi went to his friends to ask what he should do?

If you were Ravi's friend, what would you have advised Ravi to do? With what reasons would you explain that to Ravi?

(Give the students 15 minutes to write. After the students have written it, continue...)

Ravi's other friends also gave him different advise. There was no agreement among his friends. This confused Ravi even more. But one day, his wife told him that for their children, Ravi should start growing the rice the businessman has given him, even if Ravi doesn't know much about the crop and is not sure of it. This will secure the future of their children. 'It's just rice after all! Can it be that bad??' she argued.

This rice did triple his income. Seeing this, all other farmers also wanted to grow only that kind of rice. But the old school teacher of the village started telling everyone that this will only harm them in the future. The money they will get only momentary, they will lose a lot of things in the long run.

Farmers from the nearby village also heard of the Ravi's triple income and wanted to grow the same rice. The businessman also wanted that all other farmers of Kokilpur village and its neighbouring villages to grow only that laboratory rice. The old school teacher wanted to stop everyone from doing the same thing. But he couldn't go alone. So he needed help.

Do you agree with him? Why? If you were the old school master what would you have done now? How would you have spread the word and convince the farmers to stop growing that laboratory rice?

(Give the students 15 minutes to write. After the students have written it, continue...)

But the old school master couldn't spread the word. He couldn't even convince any of the farmers in Kokilpur village. So soon, all the farmers were only growing the laboratory rice. The big rice family slowly died. Only the laboratory rice was living but one day it started raining very heavily and soon it was flooded. The laboratory rice started feeling sick in the flood but it didn't know what to do. It was not friends with the rain and floods. Even the farmers didn't know what to do. Soon, the laboratory rice died too. All the farmers started crying, as there was nothing to sell in the market, there was nothing to eat. The old school teacher cried the most. "I told you not to stop growing the other rice family members! But no one listened," the old school teacher cried. But still a few farmers couldn't understand why the old school teacher was saying this.

If these farmers came to you to know why the old school teacher was saying this, how would you explain it to those farmers?

If you also lived in Kokilpur village, what would you do now?

(Give the students 15 minutes to write. After the students have written it, continue...)

Note: At the end of this exercise, the story of how the Cyclone AILA wrecked the agriculture of West Bengal for three consecutive years can be told. Details of how this wreck could be avoided if the traditional saline resistant rice variety was still found, how just one variety of high yielding rice is found instead of the diverse of traditional rice varieties, the consequential agricultural difficulties and food shortage. With a recent incident like Cyclone Aila that had hit West Bengal in 2008, the students will be able to relate to the issue better.

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Annexe 3:

Few examples of chapters in the textbooks of class 7 and 8 of West Bengal Schools where the concept of biodiversity can be introduced

Class, Subject, Chapter	Chapter Details
Class 6, Life Science, Chapter 4	Man and his environment <ul style="list-style-type: none"> • Primary and external formation of plants and animals • Observation with easiest experiment of plants and animals
Class 7, Life Science, Chapter 3	Outline idea and importance of the following plants and animals: <ul style="list-style-type: none"> • Plants: Paddy, wheat, maize, pea, masur, jute, cotton, Sal, coconut, mustard • Animals: Honey bee, Silk work, fish, poultry birds • Medicinal plants: Neem, tulsi, Penicillium, sarpagandha, cinchona • Disease producing animals: Mosquito, house fly, dog
Class 7, Life Science, Chapter 4	Concept of characteristic features of plant and animals groups: <ul style="list-style-type: none"> • Outline idea of plant and animals groups (mention three identifying characters of each group and cite two examples mentioning scientific names in each group) • Plants: Flowering – Gymnosperm, Angiosperm – (i) monocot (ii) dicot, Non flowering – Algae, Fungi, Bryophyta and Pteridophyta • Animals: Invertebrates – Protozoa, Porifera, Cnidaria, Ctenophora, • Platyhelminthes, Aschel knithes, Annelida, Arthropoda, Mollusca, Echinodermata. • Vertebrates – pisces, Amphibia, Reptilia, Aves and Mammalia
Class 7, Environmental Science, Chapter 2	<ul style="list-style-type: none"> • Response of living beings to changes in environment - adaptation in plants and animals • Modification of environment by human beings to protect themselves against changes and meet their needs • Effect of human activities and population growth on agriculture, harnessing of energy, housing, industrial development and other areas of consumption and social activities (an elementary idea). • Consequences of human activities – stress on land use, water sources, energy and mineral resources; forests, ocean life; environmental degradation • Role of individuals in maintaining peace, harmony and equity nature; good neighbourly behaviour; use and misuse of common property resources
Class 8, Environmental Science, Chapter 1	<ul style="list-style-type: none"> • Ecosystem – interaction between living and non – living components, structure and function; • Energy flow through ecosystem (food – chain, food webs); examples of terrestrial and marine food – chains; • Balance in nature – importance of ecosystem
Class 8, Environmental Science, Chapter 3	Harnessing Resources: Agriculture and animal husbandry – impact on environment

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