

ANNUAL REPORT

for the year 2004-2005



Manipur Science & Technology Council (MASTEC)

(An Autonomous Body of Government of Manipur)

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Annual Report for the year 2004 - 2005

Manipur Science & Technology Council (MASTEC)

1.0 Background

The Manipur Science & Technology Council (MASTEC) formerly, State Council of Science and Technology and Environment, Manipur was set up in the year 1985 with the initiatives from the Department of Science and Technology, Government of Manipur. The Chief Minister, Manipur and the Minister in charge (S&T), Manipur are the Chairman and the Vice Chairman of the Governing Body of the Council. The Secretary, S&T, Government of Manipur is the Member Secretary of the Council. The Council got registered as an autonomous organisation of the Department of Science & Technology, Government of Manipur in January 1996 under the Manipur Societies Registration Act, 1989 subsequent to a decision of the state cabinet.

The autonomous Council is served by its own Secretariat of 20 manpower supported by the Department of Science & Technology, GOI. The Council Secretariat operates with the grants received from DST, Government of India, DST, Government of Manipur and the funds received from various agencies through projects and programmes. The autonomous Council works in co-ordination with the State Directorate of S&T in various areas of activities.

1.1 Objectives of the Council

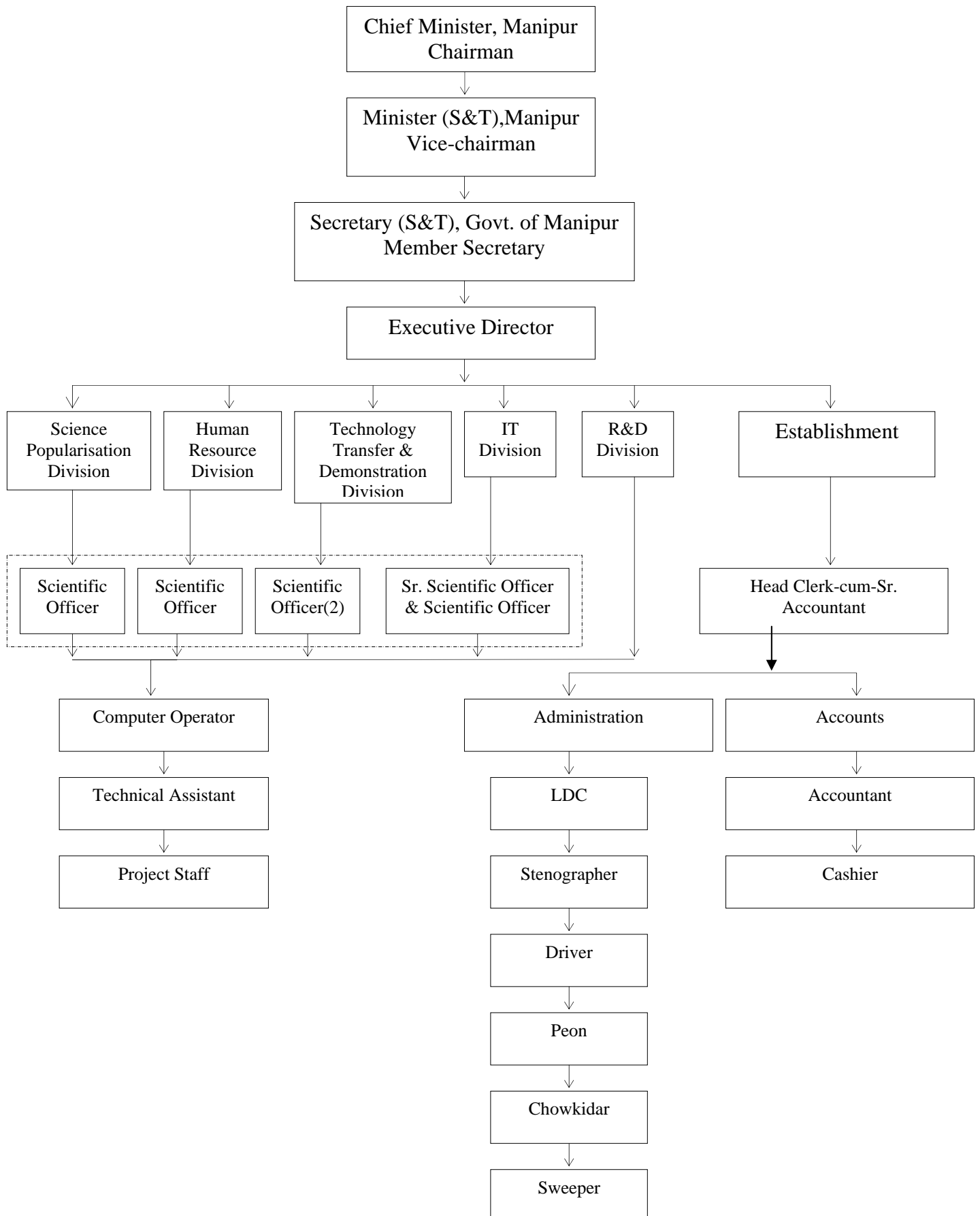
- To identify areas in which Science, Technology and Environment can be utilised for the achievement of the Socio-economic objectives of the State and in particular, tackling the problems of backwardness and underprivileged sections of Society;
- To advise on policies and measures necessary to promote Science, Technology and Environment and their utilisation for achievement of socio-economic objectives;
- To initiate, support, promote and co-ordinate Research Design and Development projects and programmes, including demonstration projects which are likely to be relevant to the problems, surveys and optimum utilisation of natural resources of the State;
- To promote and undertake activities for the popularisation of Science and Technology and the spread of a Scientific Temper and attitude among the people of the State;
- To supplement and complement the ongoing technical efforts of the State Government;
- To interact with other State, National and International Science and Technology bodies having similar or related objectives;

- To identify priority areas of Science, Technology & Environmental need for long term development of the State;
- To safeguard and promote the ecology and environment in the State of Manipur;
- To utilise Remote Sensing Techniques for planning, implementation and monitoring of development programmes with S&T inputs and to promote and support the activities of the Remote Sensing Centre;
- To promote, support and undertake the application of renewable sources of energy for the benefit of the people;
- To accept donations, raise subscriptions and receive grants, loans and subsidies from Government of India, Government of Manipur and other supportive agencies in India and abroad and to invest the resources towards the achievement of the objectives of the Council.

1.2 Organisation

The Council has a Governing Body which consists of a wide distribution of membership having expertise in various fields, with the Chief Minister as the Chairman, and the Minister in charge, S&T, Manipur as the Vice Chairman. At present there are 22 members (including two project staff) in the Council. The Council has an Executive Committee to assist the activities towards achieving the objectives of the Council. The Vice-Chairman of the Governing Body of the Council heads the Executive Committee as its Chairman. The Secretary, S&T, Government of Manipur is the Member Secretary of the Council. The Member Secretary is the Chief Executive of the Council Secretariat. (See MASTEC Organisation Chart)

Organisation Chart



1.3 Existing Staff

Sl. No.	Name	Qualification	Designation
1.	Th. Surendranath Singh	M. Sc., PGDCA, LLB	Executive Director
2.	Dr. L. Dinachandra Singh	M.Sc., PGDRS, Ph. D.	Sr. Scientific Officer
3.	Dr. L. Minaketan Singh	M.Sc., PGDRS, Ph.D.	Scientific Officer
4.	Kh. Rakesh	M.Sc.	Scientific Officer
5.	Ch. Sarat Singh	B.Tech.(Civil), M.Tech.	Scientific Officer
6.	Dr. R.K. Pritamjit Singh	M.Sc., Ph.D.	Scientific Officer

Technical Staff :

7.	Ch. Shivaji	M.Sc., PGDCA	Computer Operator
8.	Mrs H. Binodini Devi	B.Sc.	Technical Assistant
9.	Y. Shyamsunder Singh	B.Sc., LLB	Technical Assistant

Ministerial Staff :

10.	Y. Rajen Singh	B.A.	Head Clerk cum Sr. Accountant
11.	K. Nara Singh	B.A.	Accountant
12.	Mrs R.K. Bhanisana Devi	B.Sc.	L.D.C.
13.	H. Thangthianmang	B.A	L.D.C.
14.	A. Tombi Devi	B.A.	Stenographer
15.	L. Boyai Singh	VIII Passed	Driver
16.	L. Open Singh	X Passed	Peon
17.	S. Deven Singh	X Passed	Peon
18.	Jamkhanmuan	VIII Passed	Peon (Dak Runner)
19.	Mrs. Chingthanching	VIII Passed	Chowkidar
20.	Kh. Leidou Maring	VIII Passed	Sweeper

Project Staff:

21	L. Nilkumar Singh	B.F.Sc.	Research Scientist
22	Dr. Indira Devi	Ph.D. (Botany)	Research Associate
23	O. Deepak Singh	B.E. (Mechanical)	Field Assistant
24	Dr. Rabi Sarangthem	B.Veterinary .Sc	Project Assistant
25	Ningchuimi Singnaisui	B.E. (Civil)	Project Engineer
26	L. Sarat Singh	MCA	Computer Operator
27	Miss Phajaton DEvi	M.Sc.	J.R.F.
28	Th. Shyam Singh	B.Sc. (Agri)	Field Assistant
29	L. Lolini Devi	B.Sc.	Project Assistant
30	Miss Deeparani Devi	B.Sc.	Project Assistant
31	Miss W. Romita Devi	Civil Engg (Dip), FRP	Artisan Grade - II
32	Shri Manghen Vaiphei	Class VIII passed	Helper
33	L. Hemanta Singh	Class VIII passed	Skilled Mason
34	Mr. Tonglunthang	Class VIII passed	Skilled Mason
35	N. Jumbojit Singh	Class XII passed	Helper
36	Mr. Angam	Class VIII passed	Helper
37	Mr. Titus R. Naga	Class VIII passed	Helper
38	L. Sanajaoba Singh	Class X passed	Unskilled mason
39	N. Megha Singh	Class VIII passed	Unskilled mason
40	Ch. Ingobi Singh	Class VIII passed	Unskilled worker
41	Thangal Shingshit	Class VIII passed	Unskilled worker

1.4 Activities

The Manipur Science and Technology Council (MASTEC) organised various centrally sponsored workshops/trainings relevant to the state including science popularisation to fulfil the objectives for establishment of the Council. The Council receives overwhelming response from all sectors of the scientific community in the state while organising S&T programmes and organised with a big success.

The following are the programmes implemented by MASTEC during the year 2004- 2005.

1.4.1 Science Meet 2004

Since the year 1997, Manipur Science & Technology Council (MASTEC) in coordination with the leading science NGOs of the state had been continuously organising the state level science festival named as Science Meet as an annual feature. Science Meet is a multi-activity state level science festival aiming to create a common platform for students, science lovers and scientists to further the cause of Science Popularisation in the State. This year too, MASTEC in coordination with the leading science NGOs of the state like Manipur Association for Science & Society (MASS), Manipur Association for the Promotion of Science (MAPS), Manipur Science Communicators' Association (MASCA) and Generation De New Image (GENIM) has organised a 5-day long Science Meet 2004 during May 11-15, 2004 at Khuman Lampak Main Stadium, Imphal. Science Meet 2004 was organised in commemoration of the National Science Day 2004.

Inaugural Function

Science Meet 2004 was inaugurated by Prof. I. S. Khaidem, Ex. Vice-Chancellor of Manipur University and Ex. Chairman, Manipur Public Service Commission at a function at Khuman Lampak Main Stadium, Imphal on May 11, 2004. Shri Ameising Luikham, Commissioner (S&T), Government of Manipur, was the President of the function. Shri Th. Surendranath Singh, Executive Director, MASTEC gave the welcome address and introductory speech of Science Meet 2004.

In his inaugural speech, Prof Khaidem reminded the importance of science in this scientific age and also appealed to use the scientific equipments/ideas in the right direction for the development of human beings. He appreciated the scientific talents of the students of this region and also expressed that opportunities should be created for the young talents to shine for future as scientists. The Science Meet 2004 would definitely help to produce children scientists from this region he further stated. He also appealed to the science NGOs of the State to help government to find out what can be done at the best for science popularization in the State.

In the presidential remarks, Shri Ameising Luikham highlighted the influence given by science in this fast changing society. He further said that scientific knowledge must go together in making a developed nation and also lauded the role of MASTEC in the science popularization activities in the State. He thanked all the coordinating agencies



Inaugural function of S M - 2004



Section of audience S M - 2004

for jointly organising the Science Meet 2004 and further appealed to other NGOs to join hands with MASTEC so that such Science Meet would be organized with more and more fan fare every year. About 3000 (three thousand) people from student community and other sections of the society gathered at the inaugural function of the Science Meet 2004.

Activities of Science Meet 2004

The activities of the Science Meet 2004 included Painting Competition, Science Model Competition, Declamation Contest, Science Behind Miracles, Puppet Shows, Book Exhibition, Poster Exhibition, Popular Science Gallery & Model Exhibition, Face-to-Face with distinguished scientists, Popular Science Talk, Scientific Film Shows, Science Drama, IT Shows and Sky Watching

Activities of MASS

Manipur Association for Science & Society (MASS), a leading science organization in the state has been a co-organiser of the Science Meet since the year 1997 and is still a part of the Meet. This year too, MASS in coordination with MASTEC took part in the activities of Popular Science Gallery and Science Model Competition.

Popular Science Gallery

Popular Science Gallery or Interactive Model display was a grand success with visitors thronging the stall everyday to try their hands or to display their skills. Posters of Nagashaki and Hiroshima bombing and photos of MASS Nature Camp at Phoibi were exhibited during the 5 days Meet. Altogether 10(ten) interactive science models were exhibited during the Meet.

Science Model Competition

The competition was opened to students reading in class VIII – XII. Altogether 57 (fifty-seven) models were exhibited by 107 (one hundred and seven) students (73 boys and 34 girls) in the competition. The models were based on varied themes – Issues on Environment & Health – 11 models, Electronic & Electrical gadgets – 18 models, Technological Application – 22 models and other themes of interest – 6 models. The competitors were from 17 different Schools & Higher Secondary Schools of the State.



Science Model Competition

The result of the competition was as follows:

Position	Exhibitor	School	Model
1 st Position	A. Ajit Meitei	Nambol Higher Secondary School	Discarded Materials made Water Lifter
2 nd Position	L. Johnson Singh	Sacred Heart School	Emergency Door Locking
3 rd Position	Oinam Pradip Singh	Nambol Higher Secondary School	Animal Grass & Fodder Cutting Machine
Consolation	Bapin Loitongbam	Memorial Model Academy, Yairipok	Low Cost Winnowing Machine
Consolation	1. W. David Singh 2. A. Nabakumar Singh	C. C. Higher Secondary School	To Construct a Generator which will also act as its prime mover

Activities of GENIM

Generation De New Image (GENIM), Ningthoukhong in coordination with MASTEC took part in the activities like Science Drama and Science Behind Miracles during Science Meet 2004.

Science Drama

The artists of GENIM were performing a Science Dram entitled “**The Last Geese**”. The main theme of the drama was on Environment protection.

Science Behind Miracles

Miracles or magic are age-old human activities, which make people wonder or confuse and in many cases mislead the general public. The expert members of GENIM demonstrated many items of Science Behind miracles during Science Meet 2004 and the scientific backgrounds of the shows were also explained. Some of the items such as reading by ear, Counting match sticks, Rose presentation, Water to tea, Child killing box, Holy ash, Water from heaven, Change of roshgula to handkerchief, Trisul piercing in tongue, Needle piercing in skin, Miracle bag, Calling of soul, Changing of handkerchief colours, Rope tricks, Mysterious handkerchief, Fire with mental power, Vanishing and returning coin, Child killing box, Child shooter canon (top) etc were covered.

During the 5-day programme of the Science Meet 2004, Science Behind Miracles was kept for 4 (four) days of 1(one) hour duration each day and every day hundreds of students & general public were witnessed the show and many of them could learn how science is related with miracles.



Performing science drama



Explaining science behind miracles

Activities of MAPS

Three activities - Science Drama, Science Quiz and Declamation Contest were organised by Manipur Association for Promotion of Science (MAPS) in coordination with MASTEC during Science Meet 2004.

Science Drama

The artists of MAPS performed a Science Drama entitled “**Hingminnashi Eikhoi**”. The main theme of the drama was Biodiversity destruction by human beings.

Science Quiz

The competition was for students currently reading in class XI-Degree in Science/Technology. Eight teams from schools and colleges registered for the competition. Each team comprises of two students from the same school/college. Preliminary written Quiz was held on May 15, 2004 at 9.30 a.m. and four teams were selected for the final round. The final Quiz competition was held on May 15, 2004 at 12.00 noon and in the final competition there were oral as well as audio and visual



Science Quiz Competition

rounds. The Quiz was on the subjects pertaining to science and technology. The result of the Quiz competition was as follows:

Position	Participants	School
1 st Position	1. Fernando Khumlo 2. Nameirakpam Shantajit	Harvard School, Imphal
2 nd Position	1. Y. Premananda 2. Ph. Sadananda Sharma	J. N. V. Khumbong
3 rd Position	1. Hijam Chandrakumar 2. Ksh. Karnajit Singh	D. M. College of Science
Consolation	1. S. Becker 2. A. Sadananda	Eastern Higher Secondary School

Declamation Contest

The competition was opened to students currently reading in class XI-Degree in Science/Technology streams. The declamation contest was in 3(three) topics viz. Achievements of Science & Technology in India, Role of Science & Technology in the Community and Can **India become a developed Country by 2020**

Fourteen students from various institutions participated in the competition and the competition was held on May 13, 2004 at 12.00 noon.

The result of the competition was as follows:

Position	Participant	School
1 st Position	N. Ajit Singh	D. M. College of Science
2 nd Position	Yaikhomba Ch.	Sainik School Imphal
3 rd Position	Sanjay Kumar	Brajlal Institute of Sciences



Declamation Contest

Activities of MASCA

Manipur Science Communicators' Association (MASCA) in coordination with MASTEC took part in organization of activities - Science Drama, Spot Painting Competition (3 Groups), Puppet Show and Book Exhibition during Science Meet 2004

Science Drama

The artists of MASCA were performing a Science Dram entitled "O R S". The main theme of the drama was on the Health & Nutrition.

Spot Painting Competition

The competition was consisting of 3(three) groups viz., i) Sub–Junior Group (Class III–V) ii) Junior Group (Class VI–VIII) and iii) Senior Group (Class IX–X).



Spot painting competition

Sub-Junior Group

The theme of the painting was **Water is Life, let us save it** and ninety seven students participated in the competition. The result was as follows:

Position	Participants	Class	School
1 st Position	Th. Siddarth	V	Maria Montessori School
2 nd Position	Rajkumari Laisana	V	Maria Montessori School
3 rd Position	Vello Sougajjam	V	Maria Montessori School
Consolation	Surbala Takhellambam	III	Maria Montessori School
Consolation	Thoudam Babli	V	Maria Montessori School

Junior Group

The theme of the painting of this group was **Usages of Science in our everyday life** and 78 students participated in the competition. The result of the competition was as follows:

Position	Participants	Class	School
1 st Position	Ksh. Johnson Singh	VIII	Shantilata Memorial School
2 nd Position	L. Damanan	VI	Maria Montessori School
3 rd Position	Kh. Lokeshwari Devi	VII	Maria Montessori School
Consolation	Th. Premlata	VII	Maria Montessori School
Consolation	T. Diana	VII	Maria Montessori School

Senior Group

The competition was for the students currently reading in class IX-X on the theme **IT has made the World a small place**. 34 students participated in the competition and the result of the competition was as follows:

Position	Participants	Class	School
1 st Position	N. Chinglemkhomba Meitei	X	K. M. Blooming English School
2 nd Position	S. Talent Meitei	IX	Maria Montessori School
3 rd Position	Millan Laishram	X	Catholic School Canchipur
Consolation	Thokchom Sunita Devi	X	R.K. Sanatombi Devi Vidyalaya
Consolation	K. Maikel Meitie	X	Sagolmang Govt. High School

Puppet Show

The art of puppetry is very effective for communicating science to our people. Members of MASCA presented 3(three) science based puppet shows entitled **Saroi Ngaroida Shinakhrashi** (based on Environment & Forest Conservation), **Nambul Kanshi** (based on Water Conservation) and **Leimarembi Anopheles** (based on Health & Nutrition)

These puppet shows were much impressive and visitors could realize how puppetry could be used as a medium of S & T communication in the society.



Puppet Show

Book Exhibition

A Scientific Book Exhibition was also kept as an activity during the 5 (five) day long Science Meet 2004. A good number of students and teachers paid visit at the book exhibition stalls. Four local book stores/library participated in the book exhibition.

1. Sharma Book Agency : A leading book store in Manipur in scientific books.
Paona Bazar, Imphal
2. Sangam Book Store : A leading book store of scientific books, journals and newspapers.
Paona Bazar, Imphal
3. Job Centre : A leading book store in the books of competitive examinations and also the information centre of competitive examinations and employment news.
Babupara, Imphal
4. MASCA, Imphal : Exhibits its library in connection with newsletters, journals, books on science which are not available in print outs.

Activities of MASTEC

Manipur Science & Technology Council (MASTEC) arranged IT Show, Face-to-Face, Popular Science Talk, Poster Exhibition, Scientific Film Show, Declamation Contest and Sky Watching during the Science Meet 2004.

IT Show

The revolution of Information Technology (IT) has been the most important development in the world during the last few decades. Events in any part of the world can directly influence the events in the remotest areas. Internet has transformed the entire perspective of communication. Science Meet is an occasion where we can introduce IT to our students in a very effective way and hence MASTEC invited local computer institutes/firms to participate in the IT show. Four local computer institutes participated in the IT show during SM-2004. They displayed many IT shows and interacted with the visitors. Hundreds of students and teachers witnessed the IT shows and many people appreciated this activity.



Students enjoying IT Show

The computer institutes such as Mangall Infotech's Endeavor, Imphal, L.B. Institute of Technology & Management, Imphal, SSI, Imphal and CIPET, Takyel took part in the IT shows.

Face-to-Face

A face-to-face interaction programme with distinguished scientists was organised during the 5-day Science Meet 2004. Three local scientists were invited in the face-to-face programme to interact with the students on the topics of their specialized fields. The programme was kept for 3 days of 1 hour duration daily during the 5-day SM-2004. The speakers delivered lecture for about 20 minutes followed questions/quarries from the audience. Hundreds of students took part in the interaction session of the programme and they could gain maximum knowledge.



Resource Person giving Lecture

Prof. H.N.K. Sarma of Physics Department, Manipur University delivered lecture on the topic “A Brief History of Universe” and Prof B. Manihar Sharma of Life Sciences Dept. Manipur University spoke on the topic “Biosphere and Biodiversity”. Dr. R.K. Lenin Singh of Department of Psychiatry, RIMS Imphal and Shri Ch. Rajendra Singh of Imphal College delivered lectures on The Myths & Facts about Mental Illness and Transit of Venus respectively.

Popular Science Talk/Lecture Series

Popular science talk/lecture series was also one of the activities of the SM-2004. Four local resource persons delivered lectures on the topic of their specialization. The programme was kept for 3 days of 1 hour duration during 5 days long SM-2004. Hundreds of students and teachers were present at the programme and they were impressed with the talks from the resource persons.



Resource Person giving Lecture

Prof Ch. Amuba Singh Physics Dept, Manipur University delivered lecture on the topic Physical Environment – Radiation & Moisture. Shri R. S. Longjam, President, MAPS and Dr. N. Rajmuhon Singh, Chemistry Dept, Manipur University delivered on “ Biological Resources in Making India a Developed Country ” and Encouraging Scientific Awareness in the Community respectively.

Poster Exhibition

A scientific poster exhibition was also kept as one of the activities during Science Meet-2004. About 40 (forty) scientific posters were exhibited during SM-2004 out of which special posters on the rare celestial event Transit of Venus were also displayed. Many students & visitors were impressed to these posters and gave good comments.

Sky Watching Programme

In association with the Department of Physics, Manipur University, the Council setup one observatory unit with the help of a Telescope at the



Sky Watching Programme

venue of the Science Meet to observe the Stars and Planets during the Meet. Many students and visitors had witnessed the positions of the Stars and Planets. Viewers commented this programme as one of the best activity of the Meet.

Scientific Film Shows

A one hour duration scientific film show was kept on all 5 days of Science Meet-2004. Altogether 11 (eleven) scientific films were screened viz., Banana tree – the gift of nature, Urei – the tree flower, The butterfly effect, Insect migration, Super conductivity, Medicinal plants: an introduction, Grass orchid – dendrobium falconi, Oyster mushroom cultivation, Blue vandal, Kauna – club rush, Venus transit: June 8, 2004.

Best Appreciation Award

The most prestigious award of Science Meet so called **Best Appreciation Award** was introduced by MASTEC since the year 1997 to be given to the individual student who proves to have gained the maximum knowledge of science through the Meet as judged by questionnaire response and personal interview. The Best Appreciation Award 2004 for SM-2004 was given to **Mr. Achom Thunder** of Maria Montessori School, Imphal. The award carries a certificate of merit with a cash prize of **Rs. 1000/-**



Participant of BA Award Competition

Prize Sponsorships

MASTEC invited prize sponsorships from individuals, commercial firms and philanthropic organisations for the prizes of Science Quiz, Science Model Competition, Spot Painting and Declamation Contest. Shri Ch. Babu Singh of Shaktombi Memorial Trust on Science & Technology, Imphal sponsored the prizes of Declamation Contest, Dr. Th. Dhabali Singh, Babina Diagnostic Centre, Imphal sponsored the prizes of the Senior Painting Competition and Mangall Infotech, Imphal also sponsored the first prize of Science Quiz Competition. These organisations honestly sponsored the cash prizes for the promotion of better scientific knowledge of the young school and college students of the State.

Closing Function

The closing function of the 5-day long Science Meet 2004 was held on May 15, 2004 at 3.00 p.m. at Khuman Lampak Main Stadium, Imphal with Shri T. Manga Vaiphei, Hon'ble Minister (S&T), Govt. of Manipur and Shri S. Madhu Sudan Singh, Director (S&T), Govt. of Manipur in the chairs as Chief Guest and President of the function. Dr. R. K. Ranjan Singh, Registrar Manipur University & Secretary, MASS, Shri R. S. Longjam, President, MAPS, Shri L. Somarjit Singh, Secretary, MASCA and Shri Kh. Kapoor Singh, President, GENIM and many other dignitaries were present at the function.



Hon'ble Minister attending Closing Function

Shri T. Manga Vaiphei, Hon'ble Minister (S&T), Govt. of Manipur in his speech at the closing function expressed the importance of **Science Centre** being set up at



Prize Distribution

Takyelpat to inculcate scientific temper to the students of the State. He also praised the organizers for inculcating scientific temper among the students and urged the organizers to extend the activities at the lower levels to make aware of the scientific ideas to the students living in the remote areas of the State. Prof. B. Manihar Sharma gave the activity report of MASS. Shri David Singh, MAPS and Shri L. Somarjit Singh of MASCA presented the activity reports of MAPS and MASCA. Shri R.K. Birjit

Singh, Secretary, GENIM gave the activity report of GENIM. Finally, Dr. R.K. Pritamjit Singh, Scientific Officer, MASTEC gave the detail report of the Science Meet 2004.

Cash prizes with citations for the various competitions, awards were distributed to the prize-winning students during the closing function by the Chief Guest, President, Representatives of Prize Sponsors. Shri S. Madhu Sudan Singh, Director (S&T), Govt. of Manipur while giving presidential speech said that the Science Meet 2004, the state level science festival could help the state for promotion and popularization of Science & Technology. Thus ended the 5-day long Science Meet 2004 organised in commemoration of **National Science Day 2004** under the banner of **Year of Scientific Awareness - 2004**.

1.4.2 Transit of Venus: June 8, 2004

Venus, the second planet from the Sun, is often called the Earth's sister planet because of its close similarity in diameter, mass, density and probably also in composition and internal structure. It is the brightest planet of the Solar System due to the thick cloud in the atmosphere reflecting 75% of the sunlight. Because of the phenomenon known as the Green House Effect, the thick CO₂ (98%) atmosphere on Venus, its average surface temperature is about 480⁰ C, so we called it the hottest planet of the Solar System. Venus orbits at an average distance of 108.2 million km from the Sun and completes one revolution in 225 earth days at an inclined angle of 3.4⁰ to the plane of Earth's orbit. Venus rotates backward compared to the Earth and much more slowly completing one rotation in 243 earth days. In the ancient Greek mythology, Venus is known as the Goddess of Love, Peace and Beauty.



When any of the interior planets – Mercury or Venus comes between the Sun and Earth we called it as **Transit of Mercury** or **Transit of Venus**. Till now, in history, after the invention of Telescope such event have occurred only seven times – 1631, 1639, 1761, 1769, 1874, 1882 and most recently on June 8, 2004. Venus transits show clear pattern of recurrence at intervals 8, 121.5, 8 and 105.5 years. So, the next three transits will be on June 6, 2012, Dec 11, 2117 and Dec 8, 2125. The entire transit of June 8, 2004 was visible from Europe, Africa (except western parts), Middle East and most of Asia (except eastern parts). The whole Nation has also witnessed this rare celestial event on June 8, 2004 after a gap of 122 years from now. The importance of the transit are to measure the absolute distance of the Sun from the Earth – called Astronomical Unit (AU) and to grow the interest of Astronomy to the young generation. Presently as recorded 1 AU is

of about 150 million km. To be aware of and to witness this event, the National Council for Science and Technology Communications (NCSTC), Department of Science & Technology, New Delhi had taken up different activities/programmes at the school/public level all over the country very successfully.

As for the Manipur State, with the catalytic support from the NCSTC, DST, Gol, New Delhi, Manipur Science & Technology Council (MASTEC) organized five programmes all over the state under the banner of Transit of Venus: June 8, 2004. The programmes were

- (a) Resource Persons Training Programme
- (b) State Level Essay & Written Quiz Competition
- (c) Extensive Lecture Series
- (d) Panel Discussion on Venus Transit
- (e) Observation of Venus Transit

(a) Resource Persons Training Programme

Manipur Science & Technology Council (MASTEC) organized a 2-day Resource Persons Training Programme on Transit of Venus during May 27-28, 2004 at the State Guest House, Imphal. Twenty trainees from colleges/schools and state science NGOs were participating the training programme. During the training, the Master Resource Persons were giving lectures on the topics –

The Solar System, the Sun, Expedition on Transit of Venus, Solar Parallax, Eye & Vision etc. Participants were interacted with the Master Resource Persons and also observed the Sun Spots through the 3 inch Telescope on the second day of the training programme. After receiving the training from the Master Resource Persons, the trained Resource Persons started giving lectures to the Govt/private schools and local clubs throughout the State.

(b) State Level Written Essay & Quiz Competition

As part of the Transit of Venus: June 8, 2004 programme, MASTEC organized a State Level Essay and Written Quiz Competition for the school children reading in Class VIII-X on June 6, 2004 at G.P. Women's College, Imphal. The topics of the Essay and Quiz were **Our Sun** and **Transit of Venus** respectively. **132** school children from **28** different govt/private schools of the state were participating the competition. Out of which **26** students are from Class VIII, **38** from IX and **68** from



Students Participating the Competition

Class X students. The best **6** (six) students were awarded cash prizes along with citation on the Transit Day – June 8, 2004 at G.P. Women's College, Imphal with Shri N. Ibobi Singh, Principal G.P. Women's College, Shri Th. Surendranath Singh, Executive Director, MASTEC and Shri Ch. Rajendro Singh, Master Resource Person in the chairs as Chief Guest, President and Guest of Honour respectively. The winners were

Position	Name	Class	School	Cash Prize
First	Moirangthem Maltina	X	St. George High School, Wangkhei	Rs. 3000

Second	Samukcham Jemmy	X	St. George High School, Wangkhei	Rs. 2000
Third	Ningombam Ibomcha Singh	IX	Evergreen Flowers School, Thoubal	Rs. 1000
Fourth	Shambanduram Deepika Devi	X	St. George High School, Wangkhei	Rs. 500
Fifth	Md. Rizwan Sheikh	X	Maria Montessori School, Koirengei	Rs. 500
Sixth	Leishangthem Shantiluxmi Devi	IX	Evergreen Flowers School, Thoubal	Rs. 500

(c) Extensive Lecture Series

On 21st May, 2004, the statewide Extensive Lecture Series was formally started at the Royal Academy of Science, Wangkhei Ningthempukhri Mapal, Imphal with Shri Th. Surendranath Singh, Executive Director, MASTEC in the Chair. The Master Resource Persons – Shri Ch. Rajendro Singh and Shri M. Gobinda Singh were giving lectures on the Transit of Venus to the students, teachers and staff members of the school. After receiving the training from the Master Resource Persons, 8 (eight) Resource Persons also joined giving lectures at the schools and local clubs upto June 7, 2004 through out the state.



Resource Person giving Lecture



Section of participants

Two invited speakers from the Department of Physics, Manipur University, Canchipur – Prof H.N.K. Sarma and Prof Jakendra Singh delivered talks and interacted with the students and general public on the Transit Day, June 8 2004 at Manipur University Observatory Unit.

(d) Panel Discussion on Venus Transit

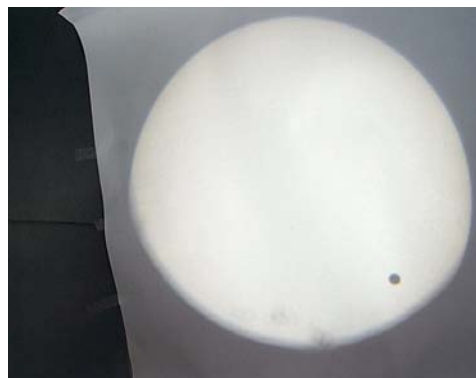


Panel Discussion Programme

A special programme – Panel Discussion on Transit of Venus was broadcast at the Local Cable, ISTV Network on June 7, 2004. The panel members were Prof. H.N.K. Sarma, Department of Physics, Manipur University, Shri Ch. Rajendro Singh, Master Resource Person, Shri M. Gobinda Singh, Master Resource Person and Shri Th. Surendranath Singh, Executive Director, MASTEC with Shri Shamu, Lecturer, Department of Physics, Presidency College, Motbung as the moderator.

(e) Observation of Venus Transit

On June 8, 2004, Manipur Science & Technology Council (MASTEC), Imphal had setup two observatory units under the sponsorship of NCSTC, DST, GoI, New Delhi to witness the rare celestial event of the Universe – the Transit of Venus across the disk of the Sun by the people of Manipur, in particular, the students. The two observatory units are one at G.P. Women's College, Imphal and other at Manipur University in co-ordination with the Department of Physics, Manipur University.



Venus Transit in Progress



Observation of Venus Transit

At the G.P. Women's College observatory unit, we setup one dark room in which projected the telescopic image of the disk of the Sun with the help of the 3 inch diameter Telescope, LCD Projector and Video Camera. Hundreds of students, teachers, science lovers and general public from the entire state were coming in groups to see the rare event since the early morning of the day. Because

of the heavy cloud since the morning we could not see the disk of the Sun and so not recorded the first two contacts – the External Ingress and Internal Ingress. But, luckily at around 12 noon the sky was clear and all were happy to see the Venus moving as a black dot on the disk of the Sun. We arranged batch-by-batch of about 100 persons for about 10 minutes each during which our Master Resource Persons and Resource Persons were explaining and discussing the queries from the viewers. More and more people thronged in the area till the evening. Again, very unfortunate, at 4.12 pm the disk of the Sun was completely covered with the huge clouds then afterwards we could not see the Venus again for the day.

At the observatory unit of Manipur University, large number of students and general public of the surrounding areas were coming to see the Venus on the disk of the Sun. Here, with the help of the students of Department of Physics, Manipur University we arranged open projection through the two – 6" & 8" diameter telescopes of Physics Department which are funded by the Department of Science & Technology, Government of Manipur. Here also we could not see the early part of the Transit due to the huge cloud but luckily after 11.40 a.m. people start watching the Venus Transit till the end. As recorded the third and fourth contacts were almost



Observation of Venus Transit

the same with the expected figures of NASA. The two Professors of the Department of Physics, Manipur University, Prof. H.N.K. Sarma and Prof. Jakendra were explaining to the viewers.

1.4.2 Year of Scientific Awareness – 2004

State Launching of Year of Scientific Awareness - 2004

Government of India has designated 2004 as the Year of Scientific Awareness (YSA). The intent here is clearly to focus attention on and to spread scientific awareness far and wide in the country – actually much faster, much farther, and much wider than what is, or has been. The YSA-2004 has been conceived of as a campaign of one full year of multiple level activities to be conducted across the length and breadth of the country. The activities will be of both Jatha and non-Jatha types and reach crores of people directly



National Science Day 2004 observation

and many more through the mass media. YSA-2004 was formally launched during the inaugural Session of the 2004 Indian Science Congress. Since then, various activities are continuously being organised throughout the Country. For Manipur State, Manipur Science & Technology Council (MASTEC) in association with the Science Teachers' Forum, Manipur (STFM) have launched YSA-2004 on 28th February, 2004 (National Science Day) at Royal Academy of Science, Imphal East District and Praja Higher Secondary School, Imphal West District.

The following activities throughout the State have been organised in co-ordination with different science organisations of the state

i) Sky Watch Programme

MASTEC, the State Co-ordinating Agency (SCA), YSA-2004 had organised Sky Watch Programme for students and general public at the Department Physics, Manipur University, Canchipur and Khuman Lampak Main Stadium during May 5, 2004 to June 9, 2004 to observe the celestial bodies and the rare event – **Transit of Venus, June 8**. Students, in particular, in large number from various parts of the state attended the programme.



Sky watch programme



YSA-2004 Radio Quiz

ii) Radio Serial “Chahishida Vigyan Khangminnarashi”

A 13 Episode Radio Serial “**Chahishida Vigyan Khangminnarashi**” was aired on Kangla Channel of All India Radio Imphal during October 10, 2004 to December 26, 2004. It included three types of programme viz; Science Quiz for Students of Class IX-XII, Group Discussion and Interview with local Resource Persons on various issues of the

YSA-2004.

iii). State Level Written Quiz Competition	October 28, 2004	
iv) Pre-Jatha Activity at Talui, Ukhrul District	November 9, 2004	
v) Release of YSA Audio Cassette	December 7, 2004	
vi) Local Cable Serial “Chahishida Vigyan Khangminnarashi”	Dec. 25 to Mar 31, 2005	
vii) Live Presentation of YSA Songs	December 31, 2004 & January 1, 2005	
viii) Pre-Jatha Activity, Bishnupur District	About 70 youths of Bishnupur District took part in the YSA Cycle Rally from Ningthoukgong to Moirang on January 23, 2005	
ix) Pre-Jatha Activity, Imphal East District	Lecture, Demonstration & Poster Exhibition at Royal Academy of Science, Imphal on January 24, 2005	
x) Pre-Jatha Activity, Chandel District	Demonstration, Lecture & Poster Exhibition at Komlathabi College, Chandel on January 28, 2005	

xi) Pre-Jatha Activity, Churachandpur District	Lecture & Poster Exhibition at Sagang Community Hall, Churachandpur on January 30,	
xii) Pre-Jatha Activity, Thoubal District	Lecture, Field Demonstration, Poster Exhibition and Scientific Film Show at Eco Park, Kakching on January 30, 2005	
xiii) Pre-Jatha Activity, Tamenglong District	Lecture, Poster Exhibition, Spot Quiz & Explaining Science Behind Miracles at Noney, Tamenglong on January 31, 2005	
xiv) Pre-Jatha Activity, Imphal East District	Vigyan Cycle Rally within Singjamei area of Imphal East on February 6, 2005. The programme was jointly organised with the local Club.	
xv). Pre-Jatha Activity, Imphal West District	Lecture, Model & Poster Exhibition & Spot Quiz at Ideal Public School, Mayanglangjing on February 6, 2005	
xvi) Pre-Jatha Activity, Senapati District	Lecture, Model & Poster Exhibition & Explaining Science Behind miracles at Mt. Everest College, Senapati on February 7, 2005	

xvii) Observation of National Science Day - 2005

The Year 2005 has been designated as the “World Year of Physics” by the United Nations coincided with the centenary of the discovery of the “Theory of Relativity” by Albert Einstein in 1905 and the “Golden Decade 1895-1905” in which discoveries of

Physics like; X-Rays (1895), Radioactivity & Zeeman Effect (1896), Electron (1897), Quantum Theory (1900) and Photo Electric Effect & relativity (1905) were made. The DST has announced the theme of the National Science Day-2005 as “Celebration of Physics”. In Manipur also, Manipur Science & Technology Council in association with Modern College, Imphal observed the National Science Day-2005 at Modern College, Imphal. The main activities of the day were Book & Poster Exhibition, Lecture Series by three Resource Persons and interaction with the Students of the school/college.

xviii) State Level Written Quiz on Space Science



The Regional Organising Committee, YSA-2004 in coordination with North East Space Application Centre (NESAC), Shillong is being planned to organise a Regional Space Quiz in Assam during May, 2005. To nominate one Team from the State, MASTEC in coordination with the leading science NGOs of the state has organised district level written quiz on Space Science in all the 9 districts of the State during March, 2005. On March 23,

2005 MASTEC organised State Level written and interactive quiz competition on Space Science of the nominated winners from the districts at G.P. Women College, Imphal.

xix) Two Day State Level Jatha Volunteers Training

The State Level Jatha Volunteers Training for the YSA-2004 Main Jatha was organised during March 24-25, 2005 at G.P. Women College, Imphal. Seven Volunteers from each of the district were participated. The participants were trained the explanation/demonstration of the YSA Kits like Science Models, Booklets, Folders, Posters, Food Adulteration Testing, Water & Soil Testing and the art of playing Puppet Play.



Jatha Volunteers Training

xx) Launching of the Main Jatha of YSA-2004

The Main Jatha of YSA-2004 was formally launched on March 27, 2005 at different places of the State by the concerned district coordinators with varieties of activities.

1.5 Official Visit of Officers on deputation

Sl. No.	Name & Designation	Date	Purpose and Venue
1.	Th. Surendranath Singh Executive Director		Meeting on Micro Hydrel Projects at New Delhi
2	do	May 17, 2004	Meeting on S&T Mapping at New Delhi
3	do	Feb 10-11, 2005	ROC meeting on Year of Scientific Awareness at Gauhati

4	Dr. L. Dinachandra Sr. Scientific Officer	December 17, 2004	Group monitoring meeting for State S&T Councils on S&T related projects at INSA, New Delhi
5	do	January 3-5, 2005	International workshop on Membrane Reactors held at Kolkata
6	Dr. L. Minaketan Singh Scientific Officer	November 30 –Dec 2, 2004	Group Monitoring Workshop (GMW) held at Mysore
7	do	March 31, 2005	Regional Workshop on Techno-entrepreneurs held at Gauhati
8	do	December 6, 2005	Interaction with Scientists of IVRI, Bareilly in connection with Japanese Quail rearing
9	.Kh. Rakesh Scientific Officer	August 6, 2004	Group Monitoring Meeting of Councils of S&T related projects, New Delhi
10	do	December 21-22, 2004	Meeting of the Task Force on the Biotechnology based programmes of women, New Delhi
11	Ch. Sarat Singh	December 17, 2004	Group monitoring meeting for State S&T Councils on S&T related projects at INSA, New Delhi
12	Do	January 3-5, 2005	International workshop on Membrane Reactors held at Kolkata
13	Dr. R.K. Pritamjit Singh	April 29-30, 2004	To attend master resource persons training on Transit of Venus
14	Do	July 30, 2004	Regional Organising Committee Meeting of YSA – 2004 at Gauhati

1.6 PROJECTS (ongoing)

Research as well as application oriented pilot projects sponsored by various central agencies / departments are being implemented by the Council. **The following are the projects supported by various central government agencies/organisations and being implemented by the professional manpower of the Council**

Highlights of the Projects :

1.6.1. Survey and Modernisation of the traditional Fishing Crafts and Gears in the Lakes and Wetlands of Manipur Phase – II sponsored by State Council Division, DST, GoI, New Delhi

Objectives:

1. To survey and inventories the traditional infra- technologies associate with the existing gears and crafts of fisher folk in Manipur Valley (work already completed in 1st phase).
2. To cause modernisation or introduction of appropriate technologies through modification of existing gears /crafts or introduction of new ones under scientific guidance and research.
3. To cause enhancement of fishing efficiency through modernised tools.
4. To cause growth of small scale industries of fishing gears and crafts in the fishermen society.
5. To save ecology and environment in the state through reduction of felling of large trees for canoe making and use of pesticides in capture fishery.
6. To bring about the overall economic development in a sustainable manner for the fishing community of Manipur.

The project is being implemented in consultation with IIT Kharagpur.

Role of IIT, Kharagpur

- 1) Selection of fishing crafts and gears that requires modification and introduction of improved/new crafts and gears.
- 2) Designing of alternative models of Fishing crafts and Gears.
- 3) Testing of hydrodynamic, stability test of the various alternative models of fishing crafts and field test of the various gears developed under the project.

MASTEC's component

- 1) Survey of the existing Fishing Crafts and Gears of the state and selection of fishing gears that has to be modified and introduction of new ones in consultation with IIT, Kharagpur and other line Departments of the State Government.
- 2) Construction and fabrication of various models of Fishing Crafts designed by IIT, Kharagpur.
- 3) Multiplication of successful prototypes at pilot scale for demonstration/ Popularisation.

Achievement /Progress of the Project :

About 45,000 fishermen and fisherwomen fish in the lakes and wetlands of Manipur valley comprising a total fishing area of 550 sq.km. These fisher-folks who maintain a subsistence economy have no other alternative other than using primitive and traditional fishing crafts and gears. The craft they use are either the dugout wooden canoe or an improvised wooden plank canoe. The various gears include wounding spears, pole and line, gorges, hooks, traps, nets etc. These fisher-folks are sinking more and more in this drudgery of working with primitive tools and techniques.

To increase fishing efficiency, Manipur Science and Technology Council with

the technical guidance of Indian Institute of Technology, Kharagpur has implemented this project. Study of the existing fishing crafts and gears with the IIT, Kharagpur team and subsequent meeting with the local experts could identify some thrust areas to work on. The thrust areas are i) improvement/modification of the existing canoe to improve the overall performance in terms of stability, working area and carrying capacity, ii) new hull form model of FRP iii) better sealing material for wooden hull construction, iv) efficient gill net fishing and purse seining, v) lighting system for night fishing.

Under the project, the following models of crafts and gears had been worked out.

Fishing Craft:-

According to the design and specification of the IIT, Kharagpur, we have constructed i) Catamaran Configuration of full size canoe and half size canoe, ii) Mono Hull Model i.e. 3 m FRP boat and 6 m FRP boat, iii) Wooden Outrigger model Canoe of the full size existing canoe, iv) FRP canoe of the full size existing canoe.

Full size Catamaran Configuration:

Catamaran configuration is nothing but joining of two identical canoes together to achieve improvement in stability as well as increase in workspace. Full size catamaran had been constructed by joining two full size existing canoes with the help of wooden plank. Fish holds are also provided with four openings two at the aft side and two at the bow side and as such almost the entire length of the two canoes can be used as fish hold. Two masts are also provided one at the aft and one at the bow portion to fix light for attraction of fishes during night fishing.

Field trial and stability test was conducted with the IIT team. The operational characteristics of this model i.e. stability, working area and carrying capacity are improved substantially.

Half Size Catamaran Configuration:

The construction of Half size catamaran was made according to the configuration



Full Size Catamaran Configuration



Configuration showing fish hold

of the IIT, Kharagpur. This model is made by joining two identical canoes of smaller size (half the size of the existing canoe). Fish holds are also provided with four openings two at the aft side and two at the bow side and as such almost the entire length of the two canoes can be used as fish hold. Two masts are also provided one at the aft and one at the bow portion to fix light for attraction of fishes during night fishing.

Field trial and stability test was conducted with the IIT team. The operational characteristics of this model i.e. stability, working area and carrying capacity are improved substantially.



Trial of Half size



Half size Catamaran

Mono Hull Design

Designs for two sizes have been developed, one with carrying capacity of 300 kg and the other one with a carrying capacity of 1700 kg. Both of these models can be constructed using wood or fibre reinforced plastic.

FRP boat:

Using wooden mould, a 3 m FRP boat (prototype model) had been constructed at the workshop of Fishing Crafts and Gears Project. The boat had been provided with two fish holds one forward and one aft. Each hold has its opening (500 mm x 500 mm) with cover. The middle part was kept emptied for the fishermen to operate the boat with comfort. Good freeboard of 350 mm



Inclination test of 3m FRP boat

had been provided. Longitudinal stiffening arrangement with hat stiffeners had been used to the sidewalls and hull portion to strengthen the boat. Wooden rods were embedded at the opening of the fish holds to stiffen the deck portion. The carrying capacity as calculated is 300 kg. (2 fishermen + 200 kg load).

Field trial and stability test was conducted with the IIT team. Stability of the boat was good and working area and carrying capacity was considerably increased. However, some specific observation could be observed at the time of testing the boat. Propelling by single oar was difficult since the breadth of the boat is wide and therefore two cleats/hooks can be fixed at the mid-ship region on the side shell to enable use of double oars. Also, to bring down the cost, the thickness of the side and bottom shell laminates can be reduced by one layer. The IIT team has recommended multiplying the model for awareness generation/demonstration programme which is a very important component of the project.

6 m FRP boat:

Construction of wooden mould for fabrication of the 6 m FRP boat is going on at the Work shed of the project. Raw materials for fabrication of the 6 m boat have been procured. Fabrication work will be taken up very soon.

Wooden Outrigger model Canoe

A wooden Outrigger model of the existing canoe had been constructed. The model is nothing but attachment of one structure at one side of the aft portion of the existing canoe with the help of wooden frames to increase the stability.

Field trial and stability test of the model had been conducted with the IIT team. The stability of model was improved significantly, however certain observation could be seen. The detachable outrigger (attach structure) was not properly locked to the mother canoe, therefore a better locking system has to be worked out. Moreover, a model with outrigger attachment on both the sides of a canoe may be tried. The model has been recommended for multiplication.



Wooden Out rigger canoe

FRP canoe (of the existing size canoe):

A FRP canoe with the size of the existing canoe had been fabricated. According to the report of the field test, this model is not recommended since the stability is very less because of the high length – breadth ratio. Hence, outrigger model with FRP has been recommended for fabrication.

Gear:-

Trap:-

Taijep :- Four designs of Taijep have been developed .

- (a) Folding Taijep made of bamboo strips and net.
- (b) Taijep made of bamboo strips with double entrance.
- (c) Folding Taijep made of bamboo strips with single entrance.
- (d) Riverine Rectangular trap with folding wings.



Fig: 7. Folding Taijep made of bamboo strips and nylon net



Trial of Double entrance Taijep



Folding Trap (taijep)



Rectangular trap with wings

The above 4 models had been operated at Loktak Lake for further study. IIT team had seen the models and they had recommended for multiplication for mass awareness generation programme. However, a provision for easy removal of fishes trapped in should be worked out especially for the Riverine rectangular trap.

Purse Seine:

A purse seine is a big wall of netting which is set around a school of fish. The topside of a purse seine is hung from a float-line, which is a rope fitted with floats and its bottom side is weighted by a lead line, which is a rope fitted with sinkers. The lead line is fitted with purse-rings, which are metal rings hung by short ropes (called bridles) from the lead-line. Through these rings passes a rope called a purse-line and by pulling this rope, the fishermen bring the rings together. The rings in turn pull the lead line together until the bottom part of the purse seine is closed. In this way the purse seine becomes like a very big bag or purse, and the fish cannot get out.

Under the Project, a purse seine had been fabricated with the specification and dimension as detailed below.

Dimension and data sheet of the net

A. Net Details

Length	250 Ft
Depth	25 Ft
Mesh size	Rectangle mesh of 2x3 mm ²
Material of the net	Nylon
Method of fabrication	Loom
Cost of net	Rs 14,500/-

B. Float

1) Spherical shape (with a neck)

No of floats	125
Float Material	Plastic (Poly propylene)
Diameter of the float (D)	7 cm
Wall thickness	0.1 cm
Weight of the float	26 gm
Volume of the float (Sphere) = $\frac{4}{3}\pi r^3$	179.66 cm ³
Sp weight = Weight/Volume	0.145 gm/cm ³
Buoyancy (up thrust of the float)	61 gm
Float gap	2 Ft
Cost of float	Rs. 2.50/-

2) Cylindrical shape

Outer diameter (D)	3 cm
Inner diameter (d)	1 cm
Wall thickness (D-d)	1 cm
Length (l)	5 cm
Volume of the float $V = \pi/4 (D^2 - d^2) \times l$	31.4 cu. cm.
Weight of the float	24.5 gm
Sp. Weight = Weight / Volume	0.78 gm/ cu cm
Buoyancy (up thrust of the float)	24.5 gm
Float gap	3 ft
Cost of float	Rs. 2.50/-

C. Sinker

No of sinkers	125
Sinker Material	Lead
Shape of the sinker	Circular (ring)
Outer diameter of the sinker (D)	4.3 cm
Inner diameter of the sinker (d)	2.6 cm
Thickness of the ring	0.8 cm
Volume of the ring $V = \pi/4 (D^2 - d^2) \times H$	7.35 cm ³
Weight of the ring	78 gm.
Sp Weight= Weight/Volume	10.6 gm /cm ³
Sinkers gap	2 Ft
Cost of sinker	Rs.6/ piece

D. Rope

Head rope (plastic)	8 mm
Float line (plastic)	4 mm
Foot rope (plastic)	8 mm
Purse line (plastic)	8 mm
Length of purse line	285 Ft (10 m longer than foot rope)
Letter “V” shape ring bridle (Plastic) for ring fixing	4 mm
“V” mouth	8 inch
“V” height	6 inch
Distance between two “V” shaped bridles	1 Ft 4 inch

E. Operation and fish catch composition

No of persons operate the net	5 (Five)
No of craft used	One (plank built canoe)
Time taken to operate the net once	30 minutes
Depth of the water body where the nets was operated	2 meters
Type of water body	Pond (trial was carried out)
Other types of water body where the net can be operated	Lake, Reservoirs, Rivers etc.
No of operation of the net	One time
Area of operation	Thanga, Khunjem Leikai
Date of operation	10 th March 2005

Species of fishes caught	<i>Cirrhinus mrigala</i> , <i>Catla catla</i> , <i>Ctenopharyngodon idella</i> , <i>Amblypharyngodon mola</i> , <i>Hypophthalmichthys molitrix</i> Common carp, Big head etc.
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Operation of Purse seine net



Purse seine operation

The efficiency test of the net with both the types of Floats i.e. Spherical and Cylinder shaped was carried out at Thanga on the 11th March 2005 along with the IIT, Kharapur team. The net with the Spherical shaped floats could be operated with effective results.

Specific Observation:

The buoyancy of the cylinder shape PP float is less and not proportionate to the corresponding weight of 78 gm sinker. Because of the less buoyancy, the float line dipped in the water when the net is pulled and as a result fishes jumped out of the net. In case of the ball shape PP float, the buoyancy is about 61 gm which is comparatively high enough to bear the weight of the sinker i.e. 78 gm. Hence, at the time of pulling the footropes for closing the net, the float line floats and fishes are easily caught.

Recommendation:

- i) Fabrication of purse nets of next higher meshes.
- ii) To fabricate three different sizes of net according to the depth and area of water body.
- iii) Fixing of wings at two ends of the side to avoid escape of fish.
- iv) The depth of the net should be around five times to that of the water column.
- v) Fixing of two weights at the two bottom ends of the net.

Electro fishing device:

The electro fishing device for the hill streams specially designed by MASTEC to substitute dynamite fishing and chemical fish poisoning which are widely adopted by the villagers inhabited at the hilly regions was seen by the IIT team. Though electro fishing is not encouraged, IIT team had recommended using this device only in the Hilly areas of the state where dynamite fishing and chemical fish poisoning are widely practiced.

1.6.2 Technology Intervention for Mushroom Cultivation to generate Self employment of tribal women in Ukhrul District in Manipur sponsored by DBT, GoI, New Delhi.

Objectives:

- To involve rural masses in Scientific and organised cultivation of edible mushroom.
- To make rural population aware of protein malnutrition and motivate them for taking up protein rich mushroom to meet the protein demand.
- To train 100 women and men in production of sufficient mushrooms as fast income generating crop.
- To establish a mushroom spawn production unit at the project Site and provide quality spawn to the beneficiaries for ensured quality products.
- To establish marketing facilities of mushroom by supplying sufficient quantities for value added products.

Progress:

The project is implemented at two sites i.e. i) Technology Demonstration Unit at the premises of Science and Technology Complex at Takyelpat, Imphal and ii) Murei Village which is located in Ukhrul District (a tribal district) about 25 km from Imphal at an altitude of 800 m above msl. Spawn production and packaging and market organisation of the products will be carried out at the Technology Demonstration Unit at Takyelpat and cultivation activity and a part of semi processing of mushroom will be taken up at Murei Village by the beneficiaries.

Manipur Development Agency (MDA) which is an NGO located at Murei Village is the Co-implementing Agency of the project. The management of the project at the beneficiary's Village is taking care by MDA and activity at this site is going on under the strict supervision of MDA.

With the engagement of 2 project staff i.e. one Project Assistant and one Skilled Helper, the project is going on smoothly to achieve the project goals. The existing Solar Passive Technology Building of Manipur Science and Technology Council at Takyelpat, Imphal with a total area of 6000 sq. ft. has been utilised for the time being as the Technology Demonstration Unit of the Project. The Unit has a well-equipped Spawn Production Laboratory and a Cultivation Unit for experimental cultivation of varieties of Mushroom. The laboratory has all necessary equipments like Autoclave, Laminar Flow, Refrigerator, Water Storage Tank, Chemical balance, Kitchen Balance, Gas connection and adequate glasswares for preparation of spawn.



Laboratory producing spawn



Cultivation of Oyster Mushroom at the Technology Demonstration Unit

A few variety of Oyster mushroom such as *Pleurotus flabellatus*, *P. eous*, *P. Sapidus*, *P. Ostreatus* (Phillipine), *P. Ostreatus* (PCA) had been collected and cultured in PDA media for propagation. Besides the above, some local varieties such as *Lentinula edodes*, *Termitomyces sp.*, *Auricularia sp.*, *Schizophyllum commune*, *Volvareila sp.* are also under tissue culture for developing suitable cultivating technique. Wet preservation of the above varieties are kept as museum specimen for demonstration.

Without any technical difficulties, the laboratory has been constantly producing spawn for a few variety of Oyster mushroom. Regular production of spawn for *Pleurotus flabellatus*, *P. eous*, *P. Sapidus*, *P. Ostreatus* (Phillipine) is going on and experimental cultivation of the oyster mushroom has been taken up at the Technology Demonstration Unit for demonstration purposes with the quality spawn produced from the laboratory. So far, 60 beds comprising of *Pleurotus flabellatus*, *P. eous*, *P. Sapidus*, *P. Ostreatus* (Phillipine) had been cultivated in phase wise in Polybags of size 18" x 12" having 1 kg of dry paddy straw. About 87 kg of fresh mushroom had been harvested from these beds. Since paddy straw is abundantly available in the state, paddy straw had been selected as a material for the substrate. From the yield, it has been found that paddy straw is a good material for preparation of substrate. Laboratory is constantly producing spawn for free supply to the beneficiaries. About 330 bags of 550 g are producing every month for supply to the beneficiaries.



Spawning of Oyster Mushroom by the beneficiaries during the training programme

The project is implemented in close association with Manipur Development Agency that is located at the project site ie. Murei Village. The village is not far and is located about 25 km from Imphal. Although, there are 62 households, 55 beneficiaries had been selected for the project. In order to enable the beneficiaries to start cultivation of Oyster mushroom, a training programme for the 55 beneficiaries was conducted during September 14 – 15, 2004 at the project site. Smt S. Mema Devi, Mycologist and Co-PI of the project imparted indepth training to the beneficiaries. The topics include history of mushroom cultivation, edible and non edible mushrooms, nutritional value of edible mushrooms, types of edible mushrooms, diseases and pests of mushrooms, selection/maintenance of strain and spawning procedures, demonstration of laboratory equipments for mushroom production, specification of the cultivation sheds, demonstration of mushroom cultivation, processing, harvesting, consumption pattern and marketing of mushroom etc.

After proper selection of sites at the plots of the beneficiaries, 55 numbers of cultivation sheds of the size 10 ft x 15 ft had been constructed in each of the beneficiary's plot. Seed money of Rs. 1000/- per beneficiary was provided to all the 55 beneficiaries for construction of the

Agency that is located at the project site ie. Murei Village. The village is not far and is located about 25 km from Imphal. Although, there are 62 households, 55 beneficiaries had been selected for the project. In order to enable the beneficiaries to start cultivation of Oyster mushroom, a training programme for the 55 beneficiaries was conducted during September 14 – 15, 2004 at the project site. Smt S. Mema Devi, Mycologist and Co-PI of the project imparted indepth training to the beneficiaries. The topics include history of mushroom cultivation, edible and non edible mushrooms, nutritional



Seed Money Distribution function at Murei Village

sheds. The sheds were constructed of locally available materials i.e. bamboo and paddy straw are of the dimension 10 ft. x 15 ft. Racks made of Bamboo are kept inside the shed for cultivation of Oyster mushroom. The first phase cultivation was started during January 2005 with the cultivation of 6 beds by each beneficiary with each bed having 1 kg of dry paddy straw. About 250 gm of spawn was distributed evenly in each bed. During the month of February and March, 2005 2nd and 3rd phase oyster mushroom cultivation had been taken up by each of the 55 beneficiary.

The 1st and 2nd phase cultivation was not productive because of rat infestation to the cropping sheds and less moisture caused due to easy escape of moisture to the thin



Cultivation shed at Murei Village



Cultivation of Oyster Mushroom

side walls of straw. The production in the 3rd phase cultivation has been satisfactory since the crops are cultivated after proper renovation of the sheds. Each beneficiary has produced about 7 kg of mushrooms from the harvest of three cultivations. Infestation of rat at the spawn running and pinhead stage has been observed in some of the beneficiaries' shed. However steps are being taken up to avoid damage by rats. Using of Trap is one of the measures being adopted by the villagers to avoid rat infestation. Cultivation at this village will be going on continuously with the free supply of spawn from the laboratory for generating maximum income of the beneficiaries. Button mushroom cultivation will be taken up during the coming season.



Distribution of Spawn to the beneficiaries

1.6.3 Low Cost Housing using Stabilised Mud Blocks – Sponsored by State Councils Division, Dept. of Science & Technology, Govt. of India.

Objectives of the project:

- i) to upgrade the rural traditional kutcha houses
- ii) to introduce cost – effective and durability houses – an alternative of burnt bricks
- iii) to demonstrate and popularise the technology of stabilised mud blocks using locally available soils/muds
- iv) to uplift the poor people with standard houses of the technology
- v) to impart the technology to rural artisans for socio – economy upliftment

Progress :

- i) TARA – Balram earth compressed machine has been procured
- ii) Project staff have been trained in making of stabilised mud blocks using TARA – Balram machine
- iii) Three sites have been selected for construction of low cost houses
- iv) Construction of soil blocks for the three sites at the first instant is in progress
- v) Local youths in the village have been aware about the technology

1.6.4 Dailong Micro Hydrel project – Sponsored by State Councils Division, Dept. of Science & Technology, Govt. of India

Objectives of the project :

- i) to demonstrate the use of the cross – flow turbine developed by Indian Institute of Science (IISc) under DST, GOI project in micro hydel generation
- ii) to seek people's participation in micro hydel project implementation and management
- iii) to generate people's income through power dependent home scale industries difficult tribal areas.

Progress :

- i) Construction of Desilting tank and Forebay tank have been completed.
- ii) Earth work in excavation for penstock trench have been completed.
- iii) Joining/welding of 60 nos. of penstock pipes have been completed
- iv) Laying of 20 penstock pipes including RCC supports/saddle blocks at the joints have been completed and the work is in



Fore bay tank and diversion weir

progress

- v) Construction of Power House has been completed.

Two AC generators, two control panels, two electronic load controllers and two turbines have been received at the site and are yet to be installed.

1.6.5 Water Harvesting and Water Conservation in Imphal East – I Block, Imphal East District, Manipur – sponsored by Ministry of Water Resources, New Delhi.

Objectives of the project :

- i) to identify surface and ground water resources
- ii) to investigate ground water potentiality
- iii) to assess the quality of surface and ground water for domestic and irrigation purposes

- iv) to carry out management practices for deteriorated water
- v) to construct suitable water harvesting, soil and water conservation structures
- vi) to prepare action plan packages for management of water resources.

Progress :

The project has just started. The surface water resources have been identified and mapping is in progress. Hydrogeomorphological mapping of the area is also in progress.

1.6.6. Japanese Quail Demonstration cum Production Centre sponsored by SSD, DST, Govt. of India

Objectives of the Project

- i) Popularisation of quail farming techniques among farmers in Manipur.
- ii) To provide hatching and incubation facility to quail farmers consistently to sustain the industry in the state.
- iii) To provide periodic training to farmers.
- iv) To provide quail eggs and quails to the farmers

Achievements / Progress

Construction of rearing shed

The demonstration center / rearing shed of the Japanese quail has been constructed at the plot of Manipur Science & Technology Council at Takyelpat, at a distance of about 4 km. in the west from the Capital town Imphal. The shed is a wooden structure with CGI sheet roofing and cement concrete floor. The shed consisted of two rooms viz, project office / staff room and quail rearing room



Japanese Quail demonstration centre

Availability of quail birds and eggs in the Demonstration Centre :

The quail birds and hatching are available in the rearing centre and these are sold to the interested farmers/ individuals/ public etc.



Adult Japanese Quails in the rearing centre

Training in Japanese Quail rearing at District level :

A two day training in Japanese Quail rearing was organised by Manipur Science and Technology Council (MASTEC) for the districts of Imphal West and Imphal East during February 17 - 18, 2005 at Takyelpat, Imphal. The training was organized as partial fulfillment of implementation of the project "Japanese Quail Demonstration cum production Centre being catalysed and supported by Science and Society Division, DST, GoI, The target participants were farmers, entrepreneurs, qualified unemployed youth, interested individuals etc. . The main objective of the training was to popularize and introduce quail farming in the state and make aware of the participants about rearing of quails for income generation

The training was inaugurated by S. Madhu Sudan Singh, Director, Department of Science and Technology (DST), Govt. of Manipur and presided over by Shri Th. Surendranath Singh, Executive Director, MASTEC. Dr. M. Dhaneswar Singh, Head, Animal Sciences Department, Central Agricultural University, Imphal attended the inaugural function as the Guest of Honour.

In his inaugural address, Shri Madhu Sudan Singh mentioned about the key role of MASTEC in the technology intervention activities during the last few years of which Quail rearing project for income generation has been one of them. He further highlighted the needs for popularization of Japanese Quail farming among the farmers, entrepreneurs etc. as a source for generating income. In his presidential remarks, Shri Surendranath Singh asked the participants to form a network with hotels, dhabhas, restaurants etc. as part of marketing strategy if they are interested in quail business work He further appealed to the participants to work sincerely to become a successful entrepreneur.

In the speech by Guest of Honour, Dr. Dhaneswar Singh expressed that by virtue of its early maturity as well as early income generation and also disease free nature, quail farming can be taken up by farmers to increase socio-economic conditions.

Earlier Dr. L. Minaketan Singh, Scientific Officer (Project PI), while welcoming the guests deliberated in brief upon the goal of the programme. Three resource persons from various organizations such as 1. Dr. M. Dhaneshwor Singh, Head, Department of Animal Sciences, Central Agricultural University, Imphal, 2. Dr. Ksh. Pabitra Singh, Officer In-charge, Central Poultry Farm, Directorate of Veterinary and Animal Husbandary, Govt. of Manipur, 3. Dr. Kh. Somorendro Singh, Poultry Specialist, State Veterinary Department imparted in depth training to the participants. The training included series of lectures, slide shows accompanied by discussion/interactions etc. Altogether 30 participants including attended the training The topics such as i) Quail industry and its prospects, ii) Management of quails, iii) . Feeding and Nutrition of quails and iv) Diseases of quails and marketing etc followed by demonstration / practical on identification of male –female birds. Later, the participants along were taken to the recently constructed Quail Demonstration Centre of MASTEC at Takyelpat where adult quails were kept.

Training for Ukhrul district

A one day training in Japanese Quail rearing was organised by Manipur Science and Technology Council (MASTEC) for the districts of Ukhrul on February 21, 2005 at the conference hall of the Little Angels English School, Ukhrul.

The training was inaugurated by Mrs Soso Shaiza, Principal, Little Angels English School, Ukhrul and presided over by Dr. L.Dinachandra Singh, Senior Scientific Officer, MASTEC. Twenty five participants from different places in Ukhrul district attended the

training. Two resource persons: 1. Dr. Ksh. Pabitra Singh, Officer In-charge, Central Poultry Farm, Department of Veterinary and Animal Husbandary, Govt. of Manipur and 2. Dr. Kh. Somorendro Singh, Poultry Specialist, State Veterinary Department delivered lectures and also interacted with the participants.

Process for setting up a Hatchery unit.

A hatchery unit is yet to be set up as part of implementation of the project for which formalities for procurement of an incubator cum hatcher from the poultry equipment manufacturing companies are in progress.

1.6.7 Pilot Project on Rain Water Harvesting in Manipur sponsored by SSD, DST, GoI, New Delhi

Objectives :

- Introduction of ferro-cement tank as safe water reservoir
- Fabrication and installation of 15 numbers of demonstration based roof top rain water harvesting structures (five structures in the 1st year and 10 structures in the 2nd year) in the select places in the state.
- Popularisation of rain water harvesting techniques in the state.

Technical Back-Up Support & Linkages with nearby institutions:

- i) Regional Research Laboratory (RRL), CSIR, Jorhat, Assam provides technical guidance and related literature from time to time as and when required.
- ii) The Manipur Building Centre, Imphal provides full co-operation and also shared expertise.

Achievement:

- i) Man power/ Project staff including Project Engineer trained

The three Project Staffs (one engineer and two masons)engaged in the ongoing project have been trained at the Applied Engineering Division of Regional Research Laboratory (RRL), CSIR, Jorhat (Assam) about fabrication and construction of various types of ferro-cement tanks for storage of water in the month of July 2004.

- ii) Fabrication and Construction works started

The first demonstration based ferro-cement structure for a capacity of 6000 liters (4000 liters and 2000 liters) has been fabricated and constructed at Takyelpat, Imphal West District. Performance of the tank has been very satisfactory and the tank has been successfully used for storage of water. The construction of the remaining rain water harvesting structures is in progress.



Fabrication of skeletal cage

Materials used :-

Steel rods, chicken wire mesh, cement, sand, water proof materials etc.

Steps adopted

- Preparation of base foundation
- Preparation of bottom floor
- Fabrication of body skeletal cage and roof portion with steel rods
- Fixing of chicken wire mesh in equal distribution
- Plastering using cement mortar
- Performance test



Plastering using cement mortar

Training Workshop on Rain Water harvesting.

The 6 (six) day long training on Rain Water Harvesting was organised during February 2-7, 2005 at Takyelpat, Imphal West as partial fulfilment of implementation of the ongoing project entitled “ Pilot project on Rain Water Harvesting” supported by Science & Society Division (SSD), DST, GoI, New Delhi. Thirty participants including civil engineers and masons participated in the training. The main objective of the training were to popularise rain water harvesting techniques and also impart training about construction of ferro-cement tanks for storage of water.

Shri S. Madhu Sudan Singh, Director, S&T, Govt. of Manipur inaugurated the training. Shri L. Swamikanta Singh, Executive Engineer, PHED, Govt. of Manipur was the Guest of Honour of the inaugural function. Shri Th. Surendranath Singh, Executive Director, MASTEC presided over the inaugural function held on February 2, 2005 at 11 a.m.



A section of participants

Shri N. Gitkumar Singh, Member Secretary, Manipur Building construction centre, Imphal , Shri Ng. Dilip Singh, Engineer, Planning and Development Authority

(PDA), Imphal and Shri L. Swamikanta Singh, Executive Engineer, PHED imparted in-depth training and interacted with the participants. Shri L. Swamikanta Singh delivered lectures on the topics 1. Fundamentals of Rain Water Harvesting and its applications and 2. Need for popularisation of rain water harvesting in the state. Shri N. Gitkumar Singh delivered lectures on the topics 1. Materials required for construction of ferro-cement tanks and 2. Selection of appropriate design / shape of the tank for storage of water. Ng. Dilip Singh delivered lectures on the topics 1. Types of Ferro-cement tanks and its construction techniques and 2. Ferro-cement tanks and its advantages over other water storage structures.

During the course of the training, as part of the hands on experiment, the participants could successfully fabricate and construct two types of tanks of the capacities of 1000 litres and 500 litres respectively. The practical was conducted by Mr. Ningchuimi Singnaisui, Project Engineer.

While arranging a feed back session, most of the trainees were of the opinion that the training duration was short that they could not construct various types of tanks due to time constraints. They further commented to MASTEC to arrange similar training for a longer duration not less than ten days with more time on practical.

The training ended on February 7, 2005 with a function with Shri Th. Surendranath Singh, Executive Director as the Chief Guest. Certificates were distributed to the participants at the closing function.

1.6.8 Drip Irrigation System for Rabi Crops of Manipur sponsored by State S&T Councils Division, DST, GoI, New Delhi

Objectives :

- i) To substitute the flooding method/manual method of giving water to each plant by drip irrigation system
- ii) To eliminate land levelling in undulating/hilly region.
- iii) To maximise utilization of available water
- iv) To increase the cultivable area and yield of the crops.

Project Sites : The first site of the project in which the first drip irrigation system has been installed is a plot measuring about 0.5 acres at Langthabal Kunja village in Imphal West District about 9 kms. from Imphal Head Quarter. The source of water of the site is stored rain water and a small natural stream (perennial) located at about 100 metres from the plot. The type of soil of the plot is loamy clayed. The second and third sites of the project are yet to be identified. However, surveys have been conducted at some places at the outskirts of Imphal. The main criteria used in the selection of site are i) easy accessibility, ii) fertile soil (cultivable land), iii) natural streams nearby and iv) fenced plot.

Physical Progress:

- i) Permanent Equipment such as Computer/Printer, UPS, etc have been procured.
- ii) Project Staff have been recruited.
- iii) First site has been selected and lease agreement has been entered into.
- iv) Sub-surface water storage tank has been constructed
- i) Drip irrigation system has been installed at the first site in a plot measuring about 0.5 acres.
- ii) Three different crops viz. Tomato, Brinjal and Chilli have been planted and fruits have started to come up.
- iii) Surveys have been conducted to select the 2nd and 3rd sites where drip irrigation systems are to be installed in the second year.



Installation of Drip Irrigation System



Gravitational flow Drip Irrigation System



Drip Irrigation system applied to chilli



Drip Irrigation system applied to Brinjal

Results and Discussion :

From the present study it has been observed that among the three vegetable rabi crops viz., i) brinjal ii) chilli and iii) tomato, brinjal has shown good results in respect of growth as compare to the other two crops. However, the actual results will be obtained when the crops are harvested in the end of April, 2005 or early part of May, 2005. In all the three crops drip irrigation system has shown better results than flooding and manual method of giving water to each plant.

Conclusion :

Drip irrigation system would increase the yield of crop and the maximum quantity of available water would be utilized. Drip irrigation is generally considered as a new method although the concept has been practiced from quite some time. In India too, drip irrigation system have been successfully operated in many states such as Kerala, Maharastra, Punjab, Rajasthan, Tamil Nadu etc. since the 70s. In states like Manipur where there is scarcity of water drip irrigation system can effectively be used to commonly grown rabi crops such as cauliflower, cabbage, brinjal, chilli, tomato etc. If drip irrigation system is once introduced to the farmers and its benefit be known by them this method of irrigation will surely be adopted.

1.6.9 Database Management System of the Medicinal Plants of Manipur sponsored by State S&T Councils Division, DST, Gol

Objectives :

- i) Survey and investigation of the Medicinal Plants of Manipur.
- ii) To make awareness amongst the villages about preservation/ conservation of medicinal plants of Manipur.
- iii) To formulate a database information system of Medicinal Plants of Manipur.



Survey Team with Local Practitioner

Achievement :

- i) Permanent Equipment such as Computer/Printer, UPS, Still Digital Camera, Handicam etc have been procured.
- ii) Project staff been recruited.
- iii) A questionnaire for survey/data collection has been prepared.
- iv) Surveys have been conducted to some remote places of Manipur and consulted some local publicly known medical practitioners (Maibas) in the collection of data.
- v) About 250 medicinal plants including 50 indigenous plants have been entered into the database.
- vi) First Local Project Advisory Committee (LPAC) meeting has been organised.
- vii) A 2-day state level workshop on “Medicinal Plants of Manipur has been Organized during March 30- 31, 2005 at Imphal.



Inaugural Function of the 2 days Workshop on Medicinal Plant of Manipur organised by MASTEC

1.10 Project on Community Information Centre (CIC) sponsored by Ministry of Information Technology, Govt. of India.

- Objective :**
1. To proliferate the use of Information Technology (IT) for Socio-Economic Development up to the Block Level
 2. To develop databases, locally relevant contents,. finally leading to e-governance, e-commerce,, e-learning etc.

MASTEC, NIC, Govt. of India, Imphal center and DST, Govt. of Manipur play a key role in jointly implementing the above mentioned project. NIC supports the technical know how, DST, Govt of Manipur shares in the overall administration and MASTEC handles the financial matter including the payment of monthly honorarium to the project manpower/ staffs engaged on contract basis in the project.

So far 33 (thirty three) CICs have been set up in 33 developmental blocks in the state. Each CIC has got 6 numbers of computers connected to the Internet through a VSAT

Users :

Panchayat representatives, Student members, Womens Development Organisations, Youth Club Members, NGOs, Entrepreneurs, Educational Institutions, Common men etc.

Benefits to the rural people :

- i. Internet access and e-mail connectivity
- ii. Access to data base /developmental information of national importance.

- iii. Training through distance learning techniques and connectivity to leading educational and research institutions in the country
- iv. Awareness of IT at block level

1.7 List of Scientists/Visitors

S.No.	Name & Address	Date of Visit	Purpose of visit
1	Dr. A.N. Rai PSO, NSTMIS Division DST, GOI	October, 2004	To attend the 1 st LPAC Meeting of the Project “Database Management System of the Medicinal Plants of Manipur”
2.	Shri T.K. Ghoshal Scientist in Charge, PMD (F) Ceramic Membrane Division, Central Glass & Ceramic Research Institute, Kolkata.	November, 2004	To collect water samples for analysis and survey of sites for installation of Iron Removal Plants at Manipur.
3.	Shri A.R. Basu Proprietor, ENTECH Metals Pvt. Ltd. Kolkata.	-do-	-do-
4	Shri Hariom Nanda Director, Matronics Pvt. Lt, New Delhi	November 2004	Micro Hydel Project
5.	Prof N.R. Mondal Scientists, IIT, Kharakpur	March 9-10, 2005	Final test of Fishing Crafts and Gears developed under the project “ Fishing Crafts and Gears phase –II”
6	Prof. Ck. Mukherjee IIT, Kharagpur, West Bengal	March 9-10, 2005	Final test of Fishing Crafts and Gears

1.8 Library :

MASTEC has made a modest attempt to build up its own library. The collection is about 400 (three hundred) volumes of various disciplines. In addition, a number of periodical journals, newsletters, bulletins, local papers, science publications etc. are received regularly. MASTEC aims at strengthening the library of the Council.