PD-ABM-083
96948

EVALUATION OF THE IMPLEMENTATION OF THE GHANA TRADE & INVESTMENT PROGRAM ENVIRONMENTAL MONITORING, EVALUATION AND MITIGATION PLAN (EMEMP)

SECOND EVALUATION, MAY 1995

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Last printout: July 17, 1995

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1 - TDY SCOPE OF WORK.

TDY SOW was defined in the cable "Accra 03104" and lays out the tasks to be performed as following: "Mr. Samba would be required to assess the general status of implementation of the TIP-EMEMP and suggest recommendations for improving performance. He would also be required to analyze available monitoring data to assess the impact of TIP on the environment and advise the mission on appropriate steps that it must take to minimize environmental problems associated with the program's implementation. FSN Program Specialist, William Akiwumi and Emanuel Amekor, TIP-EMEMP coordinator of the Environmental Protection Agency (EPA) will facilitate Mr. Samba's assignment.

2 - TDY PROGRAM

Wednesday, May 17, 1995	Review of TIP/EMEMP reports and relevant documentation Meet with officials of Ministry of Trade and Industry (MOTI) - Kwesi Haizel
Thursday, May 18, 1995	Working Session with TIP/EMEMP Coordinator at EPA 11:00 Meet with officials of the Institute of Aquatic Biology (IAB) Mr. Biney & Mr. Ansa-Asare. (3.30) 14:30 Seminar GERMP Water Monitoring ; 16:30 Meet with officials of the Environmental Protection Agency (EPA) - Working Session;
Friday, May 19, 1995	Reading/Writing session at the Mission; 14:30 Meet with officials of the Fisheries Research Unit Meet with officials of the Department of Forestry, Ministry of Lands and Forestry
Monday, May 22 - Wednesday,May 24, 1995	Working Session with TIP/EMEMP Coordinator at EPA
Thursday, May 25, 1995	Writing up trip report;
Friday, May 26, 1995	10:00: Debriefing meeting at USAID; 11:00: Debriefing meeting at EPA.

3 - BACKGROUND

The Trade and Investment Project (TIP) is a US $ 80 million program aimed at increasing the capacity of the private sector to generate non- traditional exports (NTEs). The principal objective of the program is to stimulate greater production and marketing of a number of NTE commodities such as pineapples, salt, shrimps and prawns,furniture and other wood products. Other possible NTEs in the future are yams,plantain, kola nuts, palm oil, aluminum sheets, scrap metal, cocoa waste and rubber sheets.

The activities promoted under TIP may have some negative impacts on the environment and natural resources, and hinder sustainability for both natural resources management and project activities. Mitigative measures may be needed to minimize or completely eliminate the negative effects. The need for sustainability of the NTE program led to the design and implementation of the Environmental Monitoring, Evaluation and Mitigation Plan (EMEMP).

The implementation of the Environmental Monitoring, Evaluation and Mitigation Plan (EMEMP) is meant to ensure sustainability and conservation of the natural resources and the environment during the

implementation of the Trade & Investment Program (TIP). The EMEMP focuses on the most significant environmental issues identified during project design, environmental assessment, and special studies undertaken prior to the implementation of TIP. Environmental issues to be monitored under EMEMP are related to NTE project activities in: a) Salt mining industry; b) Shrimp and Prawn industry; c) Forestry and furniture industry; and d) Non -traditional agricultural exports (pineapple).

The Ministry of Trade & Industry is the implementing agency for TIP, while the implementation of the TIP/EMEMP is being coordinated by the Environmental Protection Agency (EPA).

This evaluation of the implementation of the TIP/EMEMP is intended to describe the current status of the implementation of the TIP/EMEMP and formulate some conclusions to feed into the up coming AID/Ghana mission mid-term evaluation of the TIP[1].

4 - ISSUES IDENTIFIED DURING FIRST & SECOND EVALUATION

SUMMARY ISSUES (previous & current evaluation): SOLUTIONS AND RECOMMENDATIONS

ISSUES	FINDINGS AND RECOMMENDATIONS FROM 1st EVALUATION	FIN NGS AND RECOMMENDATIONS FROM CURRENT EVALUATION
	THE EMEMP WORK PROGRAM	
1. Sustainability of EMEMP activities beyond *life of project is highly doubtful for the time* being. The EMEMP is still perceived as an extra burden super-imposed on the institutions routine programs.	The first stage of the implementation of the EMEMP should have started with an Implementation Workshop. The EMEMP Implementation Workshop should be made a priority. *The workshop will explain the reasoning behind the* structure of the EMEMP document which incorporates ongoing activities of governmental institutions and NGOs. The workshop should show the linkage between the TIP/EMEMP and other monitoring programs as well as the link with ongoing activities of line agencies.	- Currently only one (IAB) of the institutions selected to participate in the implementation of the TIP/EMEMP is actively involved. For one reason or another all the others are waiting for funds, and some are not even sure of what to *do (Forestry).* - Sustainability after life of project is still doubtful, although, the workshop was held and all the stakeholders participated in it. - The workshop helped clarify the tasks to be performed by each stakeholder and explained how the TIP/EMEMP fits into the national GERMP. From there everybody seemed to be ready to start work (it was not the case, see below).
2. Line institutions are not yet fully involved in the implementation of the EMEMP, and are not prepared yet for their specific tasks.		
3. No implementation workshop yet.		
4. Even though sampling areas have been defined, sampling stations are not selected yet for any of the sectors involved in the monitoring.	Field activity will start when vehicles are in place. Note that the Fisheries Research Unit (FRU) and the Institute of Aquatic Biology (IAB) have sampling sites along the coast and at the Songor lagoon; they can be used but may not fall in the TIP monitoring areas, however where necessary, complementary sites will be selected.	- Funding to support the EMEMP was a major problem (see below). - The vehicle is still not in place, apparently the money has been released but the Ministry of Environment is holding it to buy itself a new car according to Mr. Haizel. - The whole TIP/EMEMP program is lacking logistics - Although FRU and IAB have their sampling sites in the project area, only IAB has selected those for TIP/EMEMP data collection. None of the other participants have done so.

[1] The mid-term evaluation of the TIP project is scheduled to start the week of June 26, 1995, for 4 to 5 weeks, after selection of a consulting firm in early June.

ISSUES	FINDINGS AND RECOMMENDATIONS FROM 1st EVALUATION	FIN NGS AND RECOMMENDATIONS FROM CURRENT EVALUATION
5. Final selection of all field indicators and parameters to be monitored is yet to be made.	Complementary indicators should be identified, eg. for soils fertility, shrimp & prawn biology, and impacts on forest resources.	- Scheduled for implementation in the 1995 monitoring year.
6. Plans have not been made by EPA to monitor the impacts of the program policy and legislative component.	EPA should liaise with the new Ministry of Environment to carry out this monitoring activity.	- Much progress made in two areas: setting of environmental standards, and EIA guidelines preparation. - EPA to liaise with other institutions on the other policy and legislative development issues.
7. Arrangements are still to be made to monitor the impact of NTE activities on forest resources.	Field reconnaissance visits should be made to wood/cane extraction areas to assess environmental impacts and identify parameters for monitoring.	- Nothing has been done. Everything still at the same stage. Work has still to be started for this component of the TIP/EMEMP. The EPA plans are to implement this component when the funds are available.
YEARLY MONITORING PROGRAM		
8. Each participating institution should have prepared a yearly workplan.	Each institution should furnish EPA with workplans indicating target dates for implementation of specific activities for incorporation into general workplan by the TIP/EMEMP coordinator.	- This is yet to be done and all the workplans coordinated.
9. Institutions are waiting for the Environmental Protection Agency (EPA) to make the first move by making available the necessary funds and logistics. A "wait and see" attitude is adopted in all institutions.	This issue should find a solution through the workshop and availability of field logistics.	- This still has to be done. Funds have not been released since the very first one done prior to the first evaluation (15 million cedis).
10. Baseline data collection and analysis not complete yet.	This activity can be performed before availability of funds and logistics. EPA should urgently work on this.	- Completed.
11. Preparation of field sheets not complete yet.	This also should have been done already. EPA should liaise with line agencies to put required field forms together.	- Completed (See annex)
12. Preparation of a database (customizing an appropriate computer software) not done yet	The Ministry of Trade & Industry and EPA should expedite action on the supply of PC/Computer and accessories to enable the customizing take off.	- Not ready yet; the "Atlas GIS purchased does not seem to be adequate, especially to standardize with what is used in the Region (ie. USAID "Data Sampler"). "Arc Info" should be more appropriate both for efficient data management and retrieval, and for integration with other existing data bases.
13. Besides IAB, assembling of field teams by each institution involved is not yet done. For example FRU have not selected yet the personnel assigned to the EMEMP, this should have been done and the work program easily included into their annual work load	Each line institution should assemble the field team responsible for TIP/EMEMP, and inform EPA accordingly.	- Forestry department and FRU have both nominated responsible officers for TIP/EMEMP activities. - The IAB team is currently active on data collection for NTAE and Salt mining. It can extend its activities to monitoring of shrimp & prawn spawning grounds.
INTEGRATION IN COUNTRY'S OTHER EM&E		
14. The link between the TIP/EMEMP and GERMP/NEIS is not very clear to most implementing agencies.	The workshop should address this issue.	- This was made clear during the workshop and other instances.

ISSUES	FINDINGS AND RECOMMENDATIONS FROM 1st EVALUATION	FIN NGS AND RECOMMENDATIONS FROM CURRENT EVALUATION
	GRANT AGREEMENT	
15. The environmental condition precedent for the TIP project is the implementation of the Environmental monitoring Plan. It is stated as follows: "*Evidence that the environmental monitoring plan is being implemented*" However, the way this condition precedent is stated seems to be too broad to allow abuses. The evidence required is not clearly stated in regard of its nature, level, degree, quality and importance in the EMEMP implementation.	In each term report for tranche disbursement, achievements to be made towards the satisfaction of the environmental conditionality should be defined and clearly stated.	- Please refer to chapter below this table examining the evidences for disbursement of the third tranche.
	FUNDING	
16. Delays in the release of funds by the Ministry of Trade and Industry to EPA is part of the problem for the slow start of the *implementation of the TIP/EMEMP. For* example, the release of 15 millions Cedis to EPA for the 1993 activities was done only in December 1993. 17. Delays in budgeting and funding are retarding the monitoring program.	Annual budgetary requirements for the TIP/EMEMP should be submitted to the Ministry of Trade & Industry in the last quarter of the year to enable easy release of *funds for the next year's activities.* Revisions due to increased cost should be done in early January EPA and the Ministry of Trade & Industry should discuss and determine the best approach to resolve the delay issues.	- No evolution noticed. Funds have not been released since the first 15 million cedis. Only correspondences and requests have been *exchanged between EPA and MOTI/TIMU.* - Budget was submitted for 1994 (35 million cedis) was released by Ministry of Finance, but not yet released to EPA by MOTI. Since then, no reaction from MOTI. - 1995 budget was submitted and MOTI asked for a review which has been submitted by EPA. - The issue of funding delays is not yet settled between EPA and MOTI.
	COORDINATING AGENCY	
18. Some coordinating problems have been noted.	The Environmental Protection council has the capacity to coordinate the implementation of the EMEMP. However there are some budgetary, logistical, programming and planning problems to be solved subsist. The Coordinator of the EMEMP at the EPA should get *implementing institutions more involved* with the EMEMP and set up appropriate coordination.	- EPA is coordinating the implementation of the TIP/EMEMP, and has the capability to analyze data, and disseminate the information generated. The EPA team was reinforced by the recruitment of a GIS specialist.
	PERSONNEL & TRAINING	
19 Training and staffing needs related to the implementation of the TIP/EMEMP should be assessed by EPA and line agencies.	FRU might need some more personnel and local complementary training for its personnel, especially for field personnel. Training is mainly needed for "Stock assessment" and "ecosystems management". The EPA TIP/EMEMP coordinator to facilitate local training by provision of funds and logistics to FRU. FRU to explore the use of resources and expertise in Côte d'Ivoire Fisheries Unit?	- Local training was budgeted for in 1994 but no funds was released for that. The solution would be that AID assists in organizing local training. - As well, AID should assist in sending one of the FRU staff to Dakar Oceanographic Research Center to get hands on skills in stock assessment.
	BASELINE DATA	
20. Collection of historical data is not yet complete, and data analysis for use as baseline reference for the EMEMP has only been partially performed.	The Coordinator should liaise with other institutions such as AESC/Hydro, Forestry Department, etc.. for existing data and complete analysis of data for use as baseline reference for the TIP/EMEMP.	- Historical data continue to be collected and the baseline situation will be determined from it for all the components of the TIP/EMEMP.

ISSUES	FINDINGS AND RECOMMENDATIONS FROM 1st EVALUATION	FIN NGS AND RECOMMENDATIONS FROM CURRENT EVALUATION
USE OF RESULTS OF EMEMP		
21. Arrangements are to be made for the dissemination of the findings of the TIP/EMEMP	EPA should put in place a mechanism for presenting this information in a manner that is easily accessible to users, as well as effective information dissemination process	- The TIP/EMEMP coordinator plans to organize sector specific workshops as more data become available.

5. EVIDENCES FOR DISBURSEMENT OF THE THIRD TRANCHE OF AID FUNDS FOR TIP

This chapter assesses issues that have been identified during the first evaluation as major activities to be undertaken to satisfy the conditionality for the release of the third funding tranche of the TIP to the MOTI. These are:

ISSUES IDENTIFIED DURING FIRST EVALUATION	CURRENT STATUS
1. EMEMP implementation Workshop	- Workshop was delivered to all potential participants in the TIP/EMEMP implementation
2. Supply of field monitoring vehicle	- Since the start of TIP/EMEMP implementation , no vehicle has been made available for field work.Apparently there are some serious issues to be resolved regarding logistics.
3. Final selection of field indicators and parameters for monitoring.	- Indicators have been selected and are being monitored for water quality in relation salt mining and pineapple development. For all the other activities indicator and parameter selection have to be finalized.
4. Selection of sampling sites	- This has been completed for the NTAE and salt mining sectors,and partially done for the fisheries sector
5. Analysis of historical data;	- The historical data collected so far has been analyzed alongside present monitoring data.
6. Workplan for each agency involved in the implementation of the TIP/EMEMP;	- This still has to be done. Although IAB is carrying out fie. ampling, they do not have a solid work program yet. The other institutions involved have not presented any work program either to the coordinator.
7. Field sheets for each of the line agencies;	- Field sheets are available for water quality, forestry, noise/air quality monitoring only. Other field sheets need to be developed in conjunction with the respective monitoring agencies.
8. Assembling of field teams by each of the line agencies;	- IAB has done that but the other institution do not have not communicated the list of their teams to the TIP/EMEMP coordinator.
9. Early preparation and submission of 1995 budget proposals for TIP/EMEMP by EPA;	- The 1995 budget was prepared by EPA and submitted to MOTI as indicated but no funds have as yet been released by MOTI. The Coordinator of MOTI/TIMU (Mr. Haizel) requested more clarifications which EPA has provided.
10. Local training for FRU staff for effective sample collection;	- Since no funds have been released by MOTI/TIMU, this activity has not been implemented.

ISSUES IDENTIFIED DURING FIRST EVALUATION	CURRENT STATUS
11. Disbursement of 1994 budget with explanation for any variation.	- The 1994 budget was submitted by EPA and apparently funds were released by the Ministry of Finance, but never forwarded to EPA by MOTI/TIMU. Besides the 15 million cedis from the 1993 budget, EPA have been implementing the TIP/EMEMP with its own budget.

6 - GENERAL STATUS OF IMPLEMENTATION OF THE TIP-EMEMP

61. TIP/EMEMP IMPLEMENTATION WORK PROGRAM

Comprehensive work programs have not been submitted by implementing agencies for a year now; including even IAB that has been carrying out field monitoring. Coordinator's work program, as available, should show details of each agency's monitoring program.

62. FUNDING/BUDGETING

Although availability of funds is the key condition for the implementation of the TIP/EMEMP, release of funds to EPA by MOTI for TIP/EMEMP implementation is still a problem. This problem has to be discussed at Trade and Investment Oversight Committee (TIOC). Adequate disbursement mechanisms should be set up so that the implementation of the TIP/EMEMP does not suffer from permanent delays. This issue was discussed during the first evaluation and a solution is not found yet, and seems to be getting worse.

63. INSTITUTIONS AND WORK FORCE INVOLVED

The implementation of the TIP/EMEMP requires the participation of various agencies that have been identified, contacted, and invited in the start-up workshop (see table below). Then they were requested to prepare and submit workplans and start their share of the monitoring activities. However there is only one of them, IAB, has started collecting monitoring data in the field. All the others claim that they are waiting for funds to start the field work.

IMPLEMENTING AGENCY		RESPONSIBILITIES
1.	Institute of Aquatic Biology; Chemistry department	Measurement of water quality (physical, chemical and biological parameters) in salt, shrimp/prawn & NTAE impact areas. Limnological data in coastal ecosystems.
2.	AESC Hydro-Division	Determination of water levels and flow data in salt and NTAE industry impact areas.
3.	Ministry of Agriculture; Fisheries Research Unit (FRU) Tema	Monitoring of marine fishery data over project life time. Measurement of salinity and beach water temperature along the coast of Ghana. Supply of data on fishing vessels involved in shrimp and prawn industry.
4.	Forestry Department; Accra, Kumasi & Takoradi offices.	Monitoring of volume of yearly timber harvest over the project period; Species composition of timber harvested. Survey of primary tropical forest remaining in Ghana.
5.	EPC (Environmental Quality Unit)	Overall coordination of environmental monitoring, data processing and analysis and reporting the same to TIMU. Determination of atmospheric pollution due to wood processing into furniture, excessive noise levels during furniture production. Registration of licenses of pesticides imported into the country. Monitoring of the use of counterfeit, restricted & prohibited agro-chemicals in NTAE production.
6.	Save the Seashore Birds Project/Ghana	Monitoring of water birds species/population in salt mining project areas through random counts, and the impact of project activities on their population.
7.	Remote Sensing Application Unit; University of Ghana; Geography Department.	Determination of percentage of marginal land put into agriculture because of high pressure on land resources (planned under GERMP).
8.	Survey Department	Production of maps to determine new land use patterns, deforestation, changes in vegetation, etc. (planned under GERMP)
9.	Soil Research Institute	Determination of soil fertility, erosion sites, soil capability analysis (planned under GERMP), and impact of development of NTAE on soils

Note that activities listed for #7, #8 and #9 have been planned under GERMP, hence to avoid duplication of efforts, the information for these activities will be accessed for TIP/EMEMP. Now that Remote Sensing and survey Department have received the equipment they needed, they should start providing the TIP/EMEMP with data.

64. SELECTION OF MONITORING INDICATORS/PARAMETERS

Indicators have been done for water quality monitoring and data are being collected, however for all the other components of the TIP/EMEMP, selection of indicators have to be made based on the guidance provided by the TIP/EMEMP document and on the capabilities of the agencies responsible for their implementation. The TIP/EMEMP implementation coordinator should finalize the selection of indicator for each component of the TIP/EMEMP in conjunction with the monitoring agencies.

65. HISTORICAL DATA, BASELINE SITUATION

Some agencies such as IAB, Fisheries Research Unit and Forestry Department have provided some historical data that need however to be analyzed and specified for the project activity areas. All the other agencies have not yet provided the data needed. It has to be noted that most agencies request funds to retrieve and analyze their own data!

66. MONITORING DATA COLLECTION

Only water quality data is being collected by IAB for salt mining activities and pineapple production. Data on soils, biodiversity and other parameters related to salt mining and NTAE have not started to be collected. For forestry related TIP activities (cane harvesting, furniture production, etc...), and fisheries, data collection has not been started yet. In fact there is still a long way to go to collect and analyze all the data required to assess adverse impacts on the environment and natural resources due to TIP activities.

67. DATA MANAGEMENT, ANALYSIS AND DISSEMINATION

Although the data collected as of now are very limited, it is urgent to solve the data management and analysis issues. A PC computer has been already purchased for that purpose and EPA acquired a GIS software called "Atlas GIS", however it is not set up and customized yet for TIP/EMEMP georeferenced data entry management and analysis. The newly hired GIS specialist is still learning the software and has started to digitize some maps using "Arc Info". It seems that "Arc Info" is more suitable and powerful software to manage the data. Another argument that advocates for "Arc Info" is that it is the software that is mostly used in the region and was adopted for the countries "Data Samplers" being created by AID and WRI. For compatibility and data sharing reasons it would be more advisable to adopt "Arc Info" for the TIP/EMEMP.

7 - RECOMMENDATION FOR IMPROVING PERFORMANCE

Severe problems limit the implementation of the TIP/EMEMP and solutions have to be found as fast as possible. Below are some recommendations for solving the most urgent problems:

a. There is an urgent need to solve the issues of funding and transfer of funds from MOTI to EPA to all implementing agencies. It is also suggested that the transfer of funds be made in US$ to bypass the permanent risk of devaluation of the Cedi. This would allow a safe budget management.

b. Funds should be released on a regular basis and long delays avoided to allow continuity of data collection at agreed times of the year so as to track any changes due to TIP activities.

c. Better coordination of implementing agencies;TIP/EMEMP implementing coordinator should liaise more vigorously with the responsible officers of the various agencies to ensure better performance.

d. Better programming of field activities;each monitoring agency should submit its program of activities to the TIP/EMEMP coordinator early for synthesis into the composite program.

e. Logistic: The vehicle that was planned to be purchased for use in monitoring by all the various agencies and coordination of TIP/EMEMP implementation should be acquired and transferred to EPA. This issue should be given high priority for a better support to the TIP/EMEMP implementation

f. Software: "Arc Info" seems to be more powerful than "Atlas GIS", which EPA has acquired, and is widely used in the sub-region. In addition, the "Data Samplers" funded by AID and created for WCA countries uses "Arc Info". Therefore it is recommended that the project shift to "Arc Info" for more efficient data management, retrieval, sharing/exchange, analysis and dissemination.

g. Training: The GIS specialist recruited by the EPA should be sent to Côte D'Ivoire, at the National Committee for Remote Sensing and Geographical Information (CNTIG), for about one-week training in Arc Info software applications. Also one FRU officer should be sent to the Oceanographical Center in Dakar, Senegal for training in fish stock assessment for about one week.

8 - ANALYSIS OF AVAILABLE MONITORING RESULTS

Not enough data has yet been collected to enable a comprehensive analysis. Only high levels of nutrient loads of the surface waters due to increase in pineapple production have been identified. However comments on levels of parameters measured have been made (see chapter 9.1).

9 - IMPACT OF TIP ACTIVITIES ON THE ENVIRONMENT, AND RECOMMENDED MITIGATION MEASURES

9.1 ENVIRONMENTAL IMPACT OF PINEAPPLE PRODUCTION[2]:

Following parameters were collected in the field or calculated from measurements: 1) Percent (%) contributions of nitrogen and phosphorus from small, medium and large scale farms based on percolation/run-off data; 2) Quality of surface water: in situ temperature and pH; Dissolved Oxygen (DO); Bio-chemical Oxygen Demand (BOD); flow discharge; bacteriological analysis; phytoplankton; 3) Were determined also: conductivity; Turbidity; suspended solids; Cyanide (CN); Arsenic; Total and fecal coliform.

Conclusion of the study on the Densu basin showed that pineapple mainly affected the nitrogen loads of the surface waters. Estimates indicate that they presently contribute about 90% of the total nitrogen loads, the major sources being large scale farms.

For other parameters such as BOD, phosphorus and bacteria, the deterioration in water quality is primarily due to discharge of sewage and other domestic wastes.

Note that out of all the monitoring indicators defined in the TIP/EMEMP document, only water quality parameters (physical, chemical and bacteriological parameters) and agrochemicals are being collected. Data on indicators defined to track changes in land use, soils quality, and agroecological data are not being collected yet. For land use, Survey Department has just acquired the equipment under the GERMP for digitizing and production of appropriate maps. The University remote sensing facility installed with GERMP funds is not assisting TIP/EMEMP data collection yet. Approaches will be made. For soils analysis, the EPA TIP/EMEMP coordinator will make the necessary contacts with the Soils Research Institute to arrange for collaboration.

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[2] See "Environmental impact of the production of pineapple - case study of Densu basin; by O. D. Ansa-Asare, IAB, P.O. Box 38, Achimota. TIP/EMEMP filed assessments.

PARAMETER	IMPACT OBSERVED	PROPOSED MITIGATION MEASURES
pH	The warm waters are neutral with a mean pH of 7.2, with moderate dissolve oxygen (DO)	OK for the environment
BOD	BOD levels showed values within the natural background suggesting low organic pollution.	OK for the environment
NITROGEN AND NUTRIENTS	The results show that the mean nutrient loads in the surface waters are high. These are resulting from intense agricultural (farm lands) and domestic activities. In places the nutrient loads are exceptionally high (up to 15,629.8 kg/day at Afuanam). The influence of excessive application of fertilizers has direct impact on the nitrogen load of the surface waters. Quite an appreciable amount of nitrogen in the surface waters were from the pineapple farmlands resulting in 90% of the nitrogen contribution to the surface waters of the Densu river. The contribution to nutrition loads was calculated according to the size of the farm: 1) small and medium holders contribute through runoff about 3.0 to 3.1%, and the large farmers for more than 95%.	Forum to be create by the Ministry of Agriculture extension services department to educate farmers on the appropriate practice of fertilizer application.
PHOSPHORUS	Phosphorus percentage contributions are quite small probably because of limited solubility.	OK for the environment
CALCIUM	Although calcium carbide his heavily used for flowering induction it did not leach or percolate to the surface waters. This can be caused by limited solubility, and most of it stays on site.	However the impact on soils of long term use of calcium (that fail to be exported; residual calcium) should be assessed to see whether it has an adverse effect on soils quality (structure, texture and fertility).
CHLORIDE	Chloride values are high as a result of domestic and agricultural activities in the area, mainly fertilization of large scale farms. Chloride correlated well with conductivity.	Extension officers to educate farmers on best quality and types of fertilizers application.
TOTAL DISSOLVED SOLIDS (TDS)	TDS are generally low with exceptions in the areas with high erosion and runoff.	Is pineapple development responsible for erosion in some areas? This needs to be assessed. Generally pineapple development requires clearing and land that is temporarily off production can be subject to erosion. A solution would be to leave the pineapple stumps on the ground for soil protection purposes until the land is ready to be put back into production.
CYANIDE (CN) ARSENIC (As)	CN and As concentrations are below their detection limits. This is an indication of low chemical contamination.	OK for the environment
BACTERIOLOGY	Biologically none of the sites had waters suitable for drinking or swimming according to WHO permissible limits.	Presence of bacteria in surface waters is not directly related to project activities However it can be recommended for the safety of people that measures are taken so that domestic waste is not disposed in the river or at a location where runoff waters can drive them into the water bodies.
PHYTOPLANKTON	Phytoplankton diversity and population at all sampling stations were low. This seems normal for riverain environment. Species known as causing health problems, such as the blue-green algae *Anabaena sp.* was also low.	OK for the environment

9.2 ENVIRONMENTAL IMPACT OF SALT PRODUCTION[3]:

No data on hydrology or changes in the ecosystems (species diversity and population; how does the salt mining activities affect the biology of the lagoons) in relation with salt mining activities are being collected as indicated in the TIP/EMEMP plan document. Again, only data on water quality parameters are being collected by IAB.

PARAMETER	IMPACT OBSERVED	PROPOSED MITIGATION MEASURES
pH	pH is generally neutral (6.6 to 7.8) except for one place that is highly acidic (3.6 at Sege reservoir at Songor Lagoon) because fresh water inflow was blocked. This acidic situation observed can affect a nearby marshy area especially during rains with risk to adversely impact diversity and ground waters.	The salt mining company in Songor should insure flow of fresh water from streams into the Sege reservoir to correct pH. This would not conflict with the production process.
TEMPERATURE	Surface waters temperatures are naturally high (26.0 to 35.0°C) due to the shallow depth of the lagoon. This ideal for salt production and this activity does not abnormally increase the water temperature.	No apparent problems for the environment
BOD	BOD levels in the salt production lagoons are well within the natural background (1.68 to 4.48 mg/l) implying that the lagoons do not receive organic pollution. This mean that efforts are made to keep the lagoons in optimal cleanness for good quality production.	No apparent problems for the environment
DO	DO was low in all the salt production lagoons. If temperatures are high, with slow flow, salinity and shallow depth, DO is low; which is the normal condition in lagoons. However an appreciable fish population live in the lagoons.	No apparent problems for the environment
SALINITY	Salinity value highly depend on the method of salt production. At Elmina where lagoon waters are allowed to flow freely, salinity (1.24 ppt) is lower than the background value of the coastal waters (35 ppt), while in the Songor Lagoon where waters are blocked, salinity is much higher than the natural background (81.0%).	Not significantly affecting the environment
CONDUCTIVITY	As expected in salt production grounds, conductivity is high, ranging from 2,020 to 667,000 micro-siemens/cm.	No apparent problems for the environment
COLIFORM	Although coliform concentrations can be as high as 600,000/100 ml in the different areas of the lagoons where people have access, concentrations of total and fecal coliform are zero or close to zero in the last concentration ponds	Nevertheless population access to critical areas should be limited to minimize the risks of contamination.
TOTAL SUSPENDED SOLIDS (TSS)	Suspended solid concentrations are high in the periphery of the lagoons but below 100 mg/l (allowable guideline value) in the critical areas of the salt production.	This is natural condition
CYANIDE (CN) ARSENIC (As)	These two element are under detection limits in all salt production lagoons This implies low chemical contamination.	No significant effects on the environment
BACTERIOLOGY	All the lagoons were contaminated because of the proximity of beach and the inhabited areas. However that bacteriological contamination disappears in the last salt concentration ponds because of the high salinity rates.	However measures should be taken to limit bacteriological presence in the pre-concentration ponds. This can be done by limiting population access to critical areas.

10 - PERSONS MET

[3] See "TIP environmental monitoring program water quality survey of Edinaman salt industry"; and "TIP environmental monitoring program water quality survey of Songor Lagoon salt industry", EPA and IAB; October 1994; TIP/EMEMP field assessments.

- William Akiwumi, AID program specialist;
- Emmanuel M. K. Amekor, EPA TIP/EMEMP implementation coordinator;
- Kwesi Haizel, Director, MOTI/TIMU
- Okyame Ampadu-Agyei, Deputy Director EPA;
- Dr. George Manful, Deputy Director EPA;
- Charles Biney, Acting Director Institute of Aquatic Biology
- O. D. Ansa-Asare, Institute of Aquatic Biology

11. DOCUMENTS CONSULTED

1. Implementation of the Trade and Investment Program Environmental Monitoring, Evaluation and Mitigation Plan (TIP/EMEMP); Annual report, January 1994. E. M. K. Amekor, TIP/EMEMP coordinator, EPA, Accra, Ghana.

2. Non-Traditional Agricultural Exports and Natural Resources Management in Ghana: Practices and prospects. Okyame Ampadu-Agyei, Africa Eco-farmers. April 1995.

3. Report on Fact Finding; Mission to prawn farms in Guatemala and Costa Rica in 02/8-22/1995. March 1995.

4. TIP-Environmental Monitoring, Evaluation and Mitigation Program; water quality survey of Edinan Salt Industry. October 1994. EPA and Institute of Aquatic Biology, Accra, Ghana.

5. TIP-Environmental Monitoring, Evaluation and Mitigation Program; water quality survey of Songor Lagoon. October 1994. EPA and Institute of Aquatic Biology, Accra, Ghana.

6. TIP-Environmental Monitoring, Evaluation and Mitigation Program; water quality survey of River Densu Basin. October 1994. EPA and Institute of Aquatic Biology, Accra, Ghana.

7. TIP-Environmental Monitoring, Evaluation and Mitigation Program; water quality survey of River Densu Basin. May 1994. EPA and Institute of Aquatic Biology, Accra, Ghana.

8. Environmental Impact of the production of pineapples - A case Study of the Densu Basin; by O. D. Ansa-Asare, Institute of Aquatic Biology, Accra, Ghana.

9. EPC report on TIP/EMEMP as a response to the conditionality #5 for disbursement of the second tranche. March 1994.

12. ANNEXES

12.1 NOTES TAKEN DURING INTERVIEWS

1 - MEETING WITH Mr. KWESI HAIZEL (MOTI)

- He received all the reports from TIP/EMEMP activities

- Release of funds by MOTI to finance the implementation of the TIP/EMEMP is still a problem. Since the beginning of the operation, funds were released only one time, 15 million cedis and used to:

  - Purchase a computer and accessories;
  - Compilation and processing of historical raw data;
  - Sitting allowances for meetings of working groups.

- Since then no additional funds were released although it is claimed that 35 million cedis from the 1994 budget are currently available for the TIP/EMEMP, released to the Ministry of Environment by MOTI/TIMU for the purchase of a field vehicle for EPA to coordinate

TIP/EMEMP implementation. However, EPA is still waiting for the vehicle[4].

- Mr. Hazel claims that he is prepared to fund the TIP/EMEMP with the money available but needs a formal request from EPA (note that EPA claims that several requests have already been sent to MOTI with little reaction).

- He said that the problems encountered with the TIP/EMEMP were not clear until he met lately with Mr. Emmanuel Amekor the EPA coordinator of the implementation of the TIP/EMEMP. He said he then understood that the major problems are:

  - shortage of staff at the EPA side;
  - no vehicle available for field the work to be done;
  - request for funding not sent on time.

- He said that the solution adopted with EPA is to provide the institution with three part-time consultants for data management and analysis. He stated that all expenses related to the consultants will be paid by MOTI (ie. salaries, etc...). He said that EPA had to submit to him three scenario proposals for this, however, EPA did not understand it that way and presented what they consider the most optimal proposal.

  This solution would solve temporarily the shortage in personnel EPA is facing, but it is not sustainable, and may induce a lack of interest in the implementation and data analysis of the TIP/EMEMP from EPA personnel. This may hinder any chances of follow up of the monitoring activities at the end of project.

- FIRST AND SECOND WORK SESSION WITH EPA/AMEKOR

- After reviewing the April 1995 TIP/EMEMP implementation coordinator's report, and from all discussion held at the EPA, one can notice that the TIP/EMEMP activities focus so far on water quality related to salt mining and pineapple production development. All the other components of the TIP activities are left out for the time being: timber/furniture, fisheries (shrimp/prawn), and the other agricultural NTE activities due to financial and logistic constraints.

- For the fisheries sector, existing data are being collected;

- EPA claims that a limited number of activities are being monitored because the budget that were available did not allow it. The complementary monitoring activities have been budgeted for the year (see point 4 and 5 of the partial budget submitted to MOTI/TIMU).

- Mr. Amekor will still continue to identify all the companies benefiting from TIP assistance by sector (salt mining, pineapple, forestry related activities, and fisheries) and define the monitoring program accordingly.

- Data management and analysis is still waiting to be reasonably tackled. EPA acquired a GIS software called "Atlas GIS", however it is not set up and customized yet for TIP/EMEMP georeferenced data entry management and analysis. The newly hired GIS specialist is still learning the software. He claims that he is more familiar with "Arc Info"[5].

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[4] With the coordination of EPA, the field vehicle is supposed to be used by the institutions involved in the implementation of the TIP/EMEMP in turns or simultaneously through the coordination of their field programs.

[5] "Arc Info" is more powerful than "Atlas GIS" and is widely used in the sub-region. In addition, the "Data Samplers" funded by AID and created for WCA countries uses "Arc Info". Apparently data stored under "Atlas GIS" can be retrieved by "Arc Info". The project should shift to

- Apparently the plans are to create data entries for all the components of the TIP/EMEMP.

- Besides the computer purchased with the first MOTI/TIMU release of funds, all the activities achieved so far were performed with EPA budget, not with MOTI funds.

- MEETING AT INSTITUTE OF AQUATIC BIOLOGY (IAB)

- The meeting was held with Mr. Charles Biney, Acting Director of IAB, and Mr. O. D. Ansa-Asare, chemist in charge of the TIP/EMEMP activities undertaken at the Institute of Aquatic Biology.

- Water quality sampling and analysis focus in the pineapple and salt production areas, Densu, Songor, Elmina, etc... Reports are prepared and handed over to EPA on a regular basis.

- However it seems to be too early to identify any adverse impact on the environment related to salt mining and pineapple development that can be directly and specifically attributed to the TIP project.

- IAB seems to have the adequate personnel for all TIP/EMEMP related field work and data management and analysis. The major problem they have with the TIP/EMEMP is the supply of funds by EPA and MOTI.

- PROBLEMS: Funding of the monitoring activities is the major problem IAB is facing[6]. Although the amounts claimed from EPA are very limited[7], there are a lot of difficulties to get any funds.

- There is an urgent need to solve the issues of transfer of funds from MOTI to EPA to IAB. It was also suggested that the transfer of funds be made in US$ to bypass the permanent risk of devaluation of the Cedi. This would allow the Institute to preserve safely its budget.

- Logistics and equipments are a problem: a vehicle for the field work[8] and a computer[9] are badly needed to achieve better working conditions.

- Data is being accumulated, commented and put into a report form, and sent to EPA on a regular basis. Time will come when all participants will have need to perform a coordinated analysis of data collected. They will need upgraded hardware and software.

- MEETING WITH OFFICERS RESPONSIBLE FOR FORESTRY DEPARTMENT (FD)

"Arc Info" and send the GIS specialist to the Abidjan CNTIG for a week to study how the "data Sampler" have been adapted to the Ivoirian needs.

[6] If the 35 millions Cedis are available for the TIP/EMEMP why there are difficulties to release them to EPA, for example for the purchase of a field vehicle?

[7] For example only US$200.00 (267,000.00 cedis) were claimed to perform sampling, data collection and analysis in the El Mina area.

[8] EPA was supposed to acquire a vehicle to be shared by all monitoring teams involved in the TIP/EMEMP, but everybody was expecting it for more than a year now.

[9] IAB is said to have a 286 computer. This computer seems to be quite obsolete and unable to handle newer software for data management, analysis and retrieval such as "Arc Info".

- The meeting was held with J. B. Darku (FD Accra) and Mr. Antwi (FD Kumasi). The interview shows that although Mr. Darku, the designated responsible officer for the TIP/EMEMP implementation was informed and participated in the start-up workshop, the Forestry Department did not take into account TIP/EMEMP in its activity program at all. He seemed surprised to learn that the FD should have submitted a work program to EPA and started the monitoring activities a year ago. He claimed that they were not informed and that he did not have the EMEMP plan document.

- Mr. Amekor, the TIP/EMEMP implementation coordinator promised to send again another copy of the TIP/EMEMP, and hold meetings with him to establish a work program.

- Possibilities of integration of current activities of the Forestry Department with those of TIP/EMEMP were discussed. FD plans to put together activities including 1) inventory of forest timber and non-timber resources and production, and 2) a study of cane propagation for the promotion of sustainable management of the natural resource. Mr. Antwi of the FD Kumasi is to supply existing data.

12.2 FIELD MONITORING SHEETS FOR THE VARIOUS COMPONENTS OF TIP

TIP - FIELD FORM FOR MONITORING IMPACT OF NTE ACTIVITIES ON FOREST RESOURCES

DATE :

OFFICERS INVOLVED :
DEPARTMENT/UNIT.....

IMPACT AREA OR SITE	ESTIMATED VOL OF WOOD/CANE EXTRACTED KG (TONNES)	ESTIMATED VOL OF WOOD/CANE REMAINING KG (TONNES)	ESTIMATED DEFORESTED AREA (HECTARES)	ESTIMATED NU OF OTHER ARE THE SP KG (TO

.....NAME/SIGNATURE OF SUPERVISING OFFICER

TIP - ENVIRONMENTAL MONITORING PROGRAM
FORM FOR REPORTING THE RESULTS OF CHEMICAL EXAMINATION OF WATER

NAME & ADDRESS OF LABORATORY REPORT ON CHEMICAL EXAMINATION OF WATER	
NAME/ADDRESS OF SENDER	SENDER'S REFERENCE NO. LABORATORY REFERENCE NO.
NATURE OF SAMPLE: WHERE COLLECTED:	DATE/TIME OF COLLECTION: DATE/TIME OF ARRIVAL AT LA DATE/TIME EXAMINATION COMMENC
TEMPERATURE: WATER LEVEL: PH: FLOW RATE: COLOR: TURBIDITY: SALINITY:	CONDUCTIVITY: DISSOLVED OXYGEN: TOTAL SUSPENDED SOLIDS: TOTAL DISSOLVED SOLIDS: COD

CATIONS	mg\l	ANIONS	mg\l	TRACE ELEMENTS	mg\l	
Na^+	.....	NO_3^-	.....	As	.....	B
K^+	.....	NO_2^-	.....	Cd	.....	R
NH_4^+	.....	Cl^-	.....	Pb	.....	K
Ca^{2+}	.....	F^-	.....	Hg	.....	L
Mg^{2+}	.....	CN^-	.....	Cr	.....	G
Al^{3+}	.....	HCO_3^-	.....	Zn	.....	H
	.....	CO_3^{2-}	.....	Fe	.....	N
	.....	SO_4^{2-}	.....	Ni	.....	A
	.....	PO_4^{3-} (Total)	.....	Cu	.....	H
	.....	PO_4^{3-} (Organic)	.....	Se	.....	H
	.....	Silica			.....	
		TOTAL:				

DATE OF REPORT: NAME/SIGNATURE OF SUBMITTING OFFICER:
DATE RESULTS SUBMITTED: NAME OF RECEIVING OFFICER:
REMARKS:

C:\USER\AMEKOR\AMEKOR3.DOC

TIP – FIELD FORM FOR MONITORING WASTE/POLLUTION IN FURNITURE INDUSTRY

DATE : .....

OFFICERS INVOLVED : DEPARTMENT/UNIT.....

FURNITURE PRODUCTION AREA	ESTIMATED NUMBER OF PRODUCERS (CARPENTRY SHOPS)	WASTE GENERATED VOL. OF SAWDUST GENERATED KG (TONNES)	METHOD OF WASTE DISPOSAL	AIR POLLUTION SUSPENDED PARTICULATE MATTER/DUST LEVELS	NOISE LEVELS dB_A

.....

NAME/SIGNATURE

OF SUPERVISING OFFICER

12.3 SURFACE WATER CLASSIFICATION - MAXIMUM CONCENTRATION OF ELEMENTS

SURFACE WATER CLASSIFICATION - - MAXIMUM CONCENTRATION
(units of mg/l except where stated otherwise)

Constituents	Class 1	Class 2	Class 3	Class 4	Class 5
1. Temperature[10]					
2. pH (pH units)	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5	6.5 - 8.5	6.0 - 9.0
3. Sulfate	<250	250	250	250	250
4. Chloride	<250	250	250	250	250
5. Iron	<0.3	0.3	0.5	0.5	1.0
6. Manganese	0.1	0.1	0.1	0.5	1.00
7. Copper	0.01	1.0	1.0	1.0	1.0
8. Zinc	0.05	1.0	1.0	2.0	2.0
9. Nitrate Nitrogen	<10.0	10	20	20	25.00
10. Nitrite Nitrogen	0.06	0.1	0.15	1.0	1.0
11. Ammonia Nitrogen[11]	0.02	0.02	0.02	0.2	0.2
12. Kjeldahl Nitrogen	0.5	0.5	1.0	2.0	2.0
13. Phosphate as P	0.02	0.025	0.05	0.2	0.2
14. Permanganate value	2	2	6	8	10

[10] Temperature variation caused by human activities must be limited as follows for all classes: a) Weekly average maximum temperature in summer (similar to tropical zone?) to be less than or equal to 1°C; b) Weekly average maximum temperature in winter to be less than or equal to 2°C.

[11] This value of Nitrogen present in the form of un-ionized ammonia (NH_2N).

SURFACE WATER CLASSIFICATION - - MAXIMUM CONCENTRATION (units of mg/l except where stated otherwise)					
Constituents	Class 1	Class 2	Class 3	Class 4	Class 5
15. Dissolved oxygen	>90%	>6	>5	>3	>2
16. COD	15	15	15	20	25
17. BOD	3	3	4	6	10
18. Fluoride	<1.0	1.0	1.0	1.5	1.5
19. Selenium	<0.01	0.01	0.01	0.02	0.02
20. Arsenic	0.05	0.05	0.05	0.1	0.1
21. Mercury	0.00005	0.00005	0.0001	0.001	0.001
22. Cadmium	0.001	0.005	0.005	0.005	0.01
23. Hexavalent chromium	0.01	0.05	0.05	0.05	0.1
24. Total lead	0.01	0.05	0.05	0.05	0.1
25. Cyanide	0.005	0.05	0.2	0.2	0.2
26. Phenol	0.002	0.002	0.005	0.01	0.1
27. Oil & grease (PE extract)	0.05	0.05	0.5	1.0	1.0
28. Anionic detergent	<0.2	0.2	0.2	0.3	0.3
29. Total bacteria (R??)	-		<10,000		
30. Benzo-a-pyrene	0.0025	0.0025	0.0025		

12.4 PROPOSED GUIDELINES FOR DISCHARGE OF DOMESTIC/MUNICIPAL SEWAGE BY TREATMENT PLANTS

	PARAMETER	GUIDELINE VALUE
1.	pH	6.5-9.0 pH Units
2.	Temperature	Not more than 5oC above temperature of receiving water body at the entry point(or mixing zone in case of discharge into sea) but not exceeding 32oC
3.	Colour	15 TCU
4.	Turbidity	5.0 NTU
5.	Dissolved Oxygen	6.0 mg/l
6.	Total Suspended Solids	10% increase over background level but not in excess of 100mg/l
7.	Biological Oxygen Demand(BOD5)	30.0 mg/l
8.	Oil and Grease	0.05 mg/l
9.	Ammonia(as free NH3)	0.02 mg/l
10.	Sulphide(Total)	1.0 mg/l
11.	Faecal Coliform	zero count/100ml
12.	Total Coliform	zero count/100ml
13.	Fish Monitor	Capable of supporting fish life