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THE WORLD BANK

PROJECT PERFORMANCE AUDIT REPORT

INDIA - MADHYA PRADESH FORESTRY TECHNICAL ASSISTANCE PROJECT (CREDIT 609-IN)

October 14, 1983

Operations Evaluation Department

CURRENCY EQUIVALENTS
(As of December 8, 1975)

Rs 1.00	=	Paise 100
US$1.00	=	Rs 8.91
RS 1.00	=	US$0.1123
Rs 1 million	=	US$112,250

ABBREVIATIONS

FAO/CP	-	Food and Agricultural Organization/Cooperative Program
GOI	-	Government of India
GOMP	-	Government of Madhya Pradesh
ha	-	Hectare
IDA	-	International Development Association
MPFD	-	Madhya Pradesh Forestry Department
MPSFDC	-	Madhya Pradesh State Forestry Development Corporation
NCA	-	National Commission on Agriculture
OED	-	Operations Evaluation Department
PCR	-	Project Completion Report
(r)	-	Round
SAR	-	Staff Appraisal Report
SMC	-	Sandwell Management Consultants
TPA	-	Ton per annum

GOVERNMENT OF INDIA
FISCAL YEAR

July 1 to June 30

PROJECT PERFORMANCE AUDIT REPORT

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PREFACE

This is a performance audit of the Madhya Pradesh Forestry Technical Assistance Project, for which Credit 609-IN was approved in December 1975 in the sum of US$4 million. The credit was closed in March 1983 after cancellation of US$972,000.

This audit report consists of a memorandum prepared by the Operations Evaluation Department and a Project Completion Report (PCR), dated May 31, 1983, prepared by the South Asia Regional Office.

An OED mission visited India and the project area during November 1982, just prior to physical completion. The mission held discussions with officials of the Madhya Pradesh State Forestry Development Corporation (MPSFDC) and other agencies of the Government of Madhya Pradesh (GOMP), both at headquarters offices and at field sites. Project officers were interviewed and internal documents examined. The mission also met with individuals from various private and public institutes with knowledge of the project area and its population.

The audit memorandum is based on the discussions; on observations; on interviews with Bank staff associated with the project and on a review of the PCR, the President's Report (No. P-1733-IN) dated December 16, 1975, the Credit Agreements dated February 26, 1976, correspondence with the borrower

and internal Bank memoranda on project issues as contained in relevant Bank files.

The audit finds that the data contained in PCR present an accurate view of the project's implementation achievements and shortcomings. The audit memorandum therefore consists of a summary of the project's salient design and performance features and a discussion of selected issues affecting both.

The valuable assistance provided by GOMP and the borrower's executing agency (MPSFDC) is gratefully acknowledged.

PROJECT PERFORMANCE AUDIT REPORT

MADHYA PRADESH FORESTRY TECHNICAL ASSISTANCE PROJECT
(CREDIT 609-IN)

BASIC DATA SHEET

KEY PROJECT DATA

	Appraisal Estimate	Actual or Estimated Actual	Actual as % of/a Appraisal Estimate
Total Project Cost (US$ million)	8.2	6	73
Credit Amount (US$ million)	4	3	75
Date Board Approval		12/16/75	
Date Effectiveness		05/17/76	
Date Physical Components Completed/b	04/30/81	12/31/82	131/a
Closing Date/b	12/31/81	03/31/83	131/a
Institutional Performance		Weak	

CUMULATIVE DISBURSEMENTS

	FY76	FY77	FY78	FY79	FY80	FY81	FY82	FY83
Appraisal Estimate (US$ million)	.2	1.2	2.0	2.4	3.0	4.0	4.0	-
Actual (US$ million)	0	.2	.4	1.3	1.9	2.5	2.5	3.0
Actual as % of estimate	-	16	20	54	63	63	63	75
Date of final disbursement	03/31/83							

MISSION DATA

Mission	Date (mo./Yr.)	No. of Persons	Mandays in Field	Specializations Represented /b	Performance Rating/c	Trend/d	Types of Problem/e
Identification	12/74						
Preparation	08/75						
Appraisal	08/75						
Subtotal							
Supervision 1	02/76	1	3	F	1	2	-
Supervision 2	07/76	1	3	F	2	2	M
Supervision 3	12/76	1	6	F	2	1	M
Supervision 4	07/77	2	10	F & EN	2	1	M
Supervision 5	01/78	2	10	F & DC	2	1	M
Supervision 6	03/79	1	14	F	2	1	O
Supervision 7	04/80	1	14	F	2	1	T
Supervision 8	11/80	3	12	F & EC	2	1	P/T
Supervision 9	02/83	1	10	F	2	-	P/T
Total			82 = 16 manweeks				

OTHER PROJECT DATA

Borrower	The Government of India
Executing Agency	Madhya Pradesh State Forestry Development Corporation
Fiscal Year	July 1 - June 30
Name of Currency (Rs.)	Rupee

Currency Exchange Rate:

Implementation Years Average	US$1.00 = Rs. 8.91
Intervening Years Average	US$1.00 = Rs. 8.44
Completion Year Average	US$1.00 = Rs. 9.63

/a Percentage calculated from Board approval date.
/b F = Forester, EN = Engineer, EC = Economist, DC = Division Chief.
/c 1 = problem-free or minor problems; 2 = moderate proolems; and 3 = major problems.
/d 1 = improving; 2 = stationary; and 3 = deteriorating.
/e F = financial; M = managerial; T = technical; P = political; and O = other.

PROJECT PERFORMANCE AUDIT MEMORANDUM

INDIA - MADHYA PRADESH FORESTRY TECHNICAL ASSISTANCE PROJECT
(CREDIT 609-IN)

I. PROJECT SUMMARY

1. This technical assistance project represents the first project supported by the Bank which specifically addressed forestry development in India. The credit of US$4 million was approved in December 1975, and the credit agreements were signed on February 26, 1976. The primary purpose of the project was to prove or clarify the viability of, and the techniques necessary for, the proposed establishment of an intensive forestry management and local pulp and paper mill industry. In addition, the project provided funds to study the social effects such proposed industry would have on local tribal people.

Background and Project Preparation

2. The extent of India's forestry resources is subject to much debate; there are several different forestry classifications, and assessments of tree stands vary considerably. In generalized terms about 75 million hectares are legally classified as forests; of this perhaps 35 million hectares has reasonable tree cover, and possibly as little as six million hectares retain a full complement of true forest. Overall there is a broad consensus that forestry resources have become dangerously diminished and that the forest

lands are less productive than desirable. However, there has been little consensus within States or between States and Central Government on how the problem should be addressed.

3. With minor exceptions forestry management has relied on selective specie extraction and on natural regeneration - i.e., there are few man made planted forests. Cultivation and other encroachment onto forest lands has developed a defensive posture amongst forestry staff, who mostly see their function as preserving existing resources rather than developing additional ones.1/

4. In 1972, GOI's National Commission on Agriculture (NCA) published its report on "Production Forestry - Man Made Forests"; set out guidelines for substantive change towards a more dynamic, utilization-oriented forestry program; and also recommended the creation of State Forestry Development Corporations to achieve this end. However, a Bank forestry survey mission in late 1974 found that the States were not acting on the NCA recommendations, which the Bank and FAO/CP supported.

5. The possibilities of establishing a forest based industry, particularly for pulp and paper, in the lightly populated Bastar District of Madhya Pradesh State had been under consideration and studied for over a decade. In mid 1975 a Bank mission visited India to assist the Government of Madhya Pradesh (GOMP) - in the preparation of a major project based on the earlier work and concluded that the potential was large and offered an opportunity to support the NCA recommendations2/. However, the mission was

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1/ However, since the institution of social forestry efforts, in 1976, a gradual attitudinal change is occurring.

2/ The President's Report (para. 31) states that the project would provide a major thrust towards implementation of NCA recommendations.

concerned to obtain more precise information on the existing resource base, markets, and the size and configuration of the proposed pulp/paper mills. At the same time, the proposed establishment of large scale pine plantations and ultimate logistical extraction therefrom would involve (a) the introduction of technologies not previously used in India and (b) the need for tree species trials. Further, the mission was concerned that the consequences of major change on the local tribal people (who subsist mainly on indigenous forest products) be taken into consideration and that their welfare be an integral part of any major development.

6. In view of the foregoing the Bank decided to delay financial support for the major project but to support a technical assistance project that would address the mission's concerns. The Bank also decided that formal appraisal was unnecessary; consequently an SAR was not prepared, and Board approval of this technical assistance project was on the basis of the President's Report.

7. The project design placed execution of the physical implementation and technical study components under the responsibility of the recently incorporated Madhya Pradesh State Forestry Development Corporation (MPSFDC), but studies regarding the integration of tribal people into the future major project were to be the responsibility of the State government (GOMP). A State level committee was to be established to act as a coordination link to monitor progress and to evaluate proposals for future projects.

Implementation

8. The project got off to a good start in early 1976 with the rapid assembly of the project's management team, and early indications were that

the project would be implemented with little difficulty. However, the project rapidly became involved in highly emotional public, political and technical debate on the wisdom of clear felling existing hardwood forest, and replacing it with intensively managed softwood forests. Substantial lobbies were generated against this basic approach to the establishment of a forest industry (within which the project sought to find suitable answers for implementation) and therefore against the project itself (see para. 22).

9. As all technical staff, even within GOMP's Forestry Department, were by no means committed to the basic approach, and as project (and MPSFDC) staff were essentially career officers on secondment from the Department, the substantive politically charged debate seriously affected staff morale, ability and confidence in moving forward with technical features. Thus the only part of the project carried to a reasonably logical conclusion was the technical part of the milling industry feasibility study, carried out by expatriate consultants - but the study was unable to incorporate meaningful indication of how the tribal people should be incorporated (see paras. 13 and 35).

10. Species trials and pilot tree plantations. Both these endeavors were seriously impeded by two factors: (a) lack of quality seedlings and (b) absence of sound weeding practices. Management of the seedling nursery was highly unsatisfactory; it was dogmatic in the techniques employed, uncooperative in accepting advice from visiting consultants, and uncooperative with seedling users. As a result, poor quality (and diseased) seedlings were used in both specie trials and in plantation work - seriously damaging the reliability of the former and with disastrous results on the plantation stand in the latter. The necessary (and anticipated) mechanical equipment was not

procured[3]/ for weed control, and consequently management was unable to keep weeds down to a level necessary for good plantation establishment or tree growth.

11. Logging logistics. The equipment for this component was not procured[3]/; consequently the anticipated techniques have not been proven, nor has any training in its use been carried out.

12. Civil Works. Details of why US$0.55 million was allocated from the credit (US$1.1 million gross expenditure) for this purpose are not available in project documentation. In addition to 42 staff houses, a large senior guest house and a junior staff hostel have been constructed. Surprisingly in a project of this type a considerable portion of the 18 kilometers of roads have been built to paved standards[4]/. There is also a large office complex, construction of which had only commenced shortly before the audit visit in November 1982 i.e., after decisions not to proceed further with future project proposals.

13. Tribal Study. This important component, intended to address the social needs of tribal people in the area and how they might be incorporated into future project designs, was not carried out. A report was prepared by

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3/ Empirical evidence suggests that senior management feared adverse repercussions from the procurement of the specified type of equipment, in the political climatic prevailing (see para. 9 above).

4/ Paving of roads would be uneconomic in a major future project. The presence of paved roads negates the validity of logistical element findings within any tests carried out for logging and planting out techniques.

the head of GOMP's Tribal Welfare Department but this was of a standard[5/] unacceptable to Government and has not been made available to Bank staff.

14. Consultants. There were three consultancy tasks. The major one concerned the feasibility of forest based industry in the project area. The consultant's work was timely and efficiently carried out within the terms of reference, except that the report was unable to address social dimensions. The utility of the end report is, however, of doubtful value because it is based on underlying (now probably false) assumptions that (a) intensive forest plantation management would ultimately supply the industry component with timber resources and (b) clear felling of existing forests, to initiate industry, was widely acceptable. A further consultancy was arranged to address the logistics of logging, and, although a report was produced, it is similarly of doubtful utility.

15. The third consultancy involved annual visits by consultants to advise on species trials, nursery techniques and plantation management. These consultants provided excellent advice and produced five reports. Unfortunately project management was either unwilling, or felt unable, to follow the advice given. Thus, in a purposive sense, the consultancy expenditures were wasted.

16. Costs. The project, as implemented, involved expenditures totalling Rs 50,719,000. However, revenues generated from the sale of timber, resultant on the land clearing operations, totalled approximately Rs 32 million, thus the net financial cost was about Rs 18.7 million or approximately US$2.4 million.

5/ Informally, it is understood that the report contained the personal views of the author, and was not the result of authoritative recent study work.

17. Disbursements. Against project expenditures the Bank disbursed US$3.03 million; the balance of the credit was cancelled and the loan closed on March 31, 1983, a delay of 15 months from original closing date.

Project Outcome - Summary

18. The project failed in its stated prime objectives: (a) furtherance of the NCA recommendations and (b) establishing the financial, technical and social parameters for a major forest industry enterprise in the Bastar District of Madhya Pradesh, with an eventual base of plantation forestry.

19. In physical terms the project has created staff housing and other civil works, which may have some undetermined future utility, and some 1,100 hectares of very poor quality pine plantations.

20. The experimental or testing nature of the components have been inconclusive in outcome. For example, the poor standard of the tree plantations could be interpreted as failure of the plantation as a viable system. On the other hand, the quality of some of the trees in the plantations indicate that, given adequate management, the system could be successful. While project management was less than satisfactory, its inherent effectiveness was undoubtedly adversely influenced by the macro-controversy surrounding the project, and thus the real potential of management itself is unproven.

21. The project generated considerable controversy and demonstrated that sufficient consensus does not yet exist to provide a broad based commitment to modern forestry techniques as practiced elsewhere in the world. It demonstrated that technical policies established at State Government level are insufficiently strong to withstand political attack, when their implementation involves actions not fully supported by Central Government (see following paragraphs).

II. ISSUES

A. The Controversy and Macro Strategy Considerations

22. The controversy centered on whether on not the good, remaining forest should be subject to clear felling techniques rather than selective extraction techniques. The issue was debated (and continues to be debated) both in India and amongst Bank staff and consultants. On the one hand, relatively short-term economic considerations demand the urgent establishment of forest industry whose only initial resource is the existing good indigenous forests; on the other hand, environmental considerations (effects on rainfall etc.) indicated caution in further depleting the already limited original forest areas, especially when replacement forestry techniques were untested in India's institutional and political setting. Such caution was well founded given the historical precedence of forestry exploitation without replacement in India.

23. The NCA recommendations, on which the Bank relied for a mutually acceptable (between India and the Bank) strategy, had two principal threads: (a) the need to invest in social forestry (for firewood) and (b) the need for a dynamic action program to increase forestry resources, by replanting exhausted or seriously diminished forest areas still under State control, as the major base for future forestry industry. The NCA recommendations did not include extraction of existing good forest through clear felling techniques, implicit in the requirements of the type of forest industries envisaged by other parties.

24. In the event, the Bank adopted the clear felling extraction approach despite the lack of firm support within NCA recommendations. This

resulted from four complementary circumstances: (a) within the Bank, immediate economic arguments were considered stronger than the cautionary ones, (b) at the time, technical and administrative staff supporting this approach held control positions within the GOMP, (c) the Bastar District of the State was estimated (perhaps optimistically) to contain exceptionally large good forest resources, considered grossly under-exploited by selective extraction methods, and (d) importantly, the Bank faced problems in identifying sufficiently large areas of deforested or over-exploited state reserve lands which were not already otherwise occupied and could quickly be used for reafforestation work. Therefore, the Bank had no avenue to support NCA recommendations (except the then economically unproven social forestry) in a macro-situation where the Bank had wished to give financial support to the forestry sector for some years.

25. The Bank's short term investment strategy was therefore understandable; however, the risks associated with lack of firm country commitment underpinning the strategy do not appear to have been adequately considered. More importantly, an analysis of the possible consequences of any failure with this short term strategy on long term efforts toward increasing forestry sources was neglected.

B. Technical Assistance Design Problems

26. The project, as designed, involved testing various technical, economic and managerial aspects. In composite form, however, it was essentially required to prepare a major follow-up project within an already precast focus. This led to a flaw, since in a trial/testing period the components have a logical sequence - one component being dependent on the

prior proving of another component, which could not take place within the project as designed. The simultaneous testing of minor components may be an acceptable risk, but the simultaneous testing of macro-components is not. For example, while it is feasible to run tree species trials, test nursery management techniques (before species proving) and carry out some small limited testing of planting-out and tree maintenance techniques concurrently, it is less so if the quantity of planting-out involves (as in this case) fairly large plantations. The testing of plantation techniques required for specific species is premature until the species is proven and particularly when the plantation is to be on land cleared by unproved techniques. This is compounded when macro-forest industry investment studies are simultaneously instituted, which already presuppose establishment of not only successful plantations, but of trees with specific characteristics. Additional sequential failure in design is evident when both the logging efficiency, which is crucial to the economic feasibility of the industry, and the tree spacing etc. within yet to be proved plantations, have to be assumed to fit the requirements of a pre-assumed and untested logging technique.

27. Evidence indicates that technical officers in the Bank strongly advised against the simultaneous approach adopted in project design. Instead, it was recommended that a more sequential approach be adapted; staff specifically objected to the inclusion of industry feasibility studies before the base forestry establishment factors had been addressed and before studies of tribal people (in the area) had been completed and analyzed. However the Bank had already committed itself to the overall strategy (paras. 22 through 25), and, having informally encouraged GOMP to believe the Bank would

support fairly quick substantial investments, the Bank could hardly back down to the limited project scope recommended by technical staff. GOMP essentially wanted a forest industry, which required a feasibility study at substantial cost, and this drove the direction of the testing/trial component rather than the other way around.

28. In hindsight, it should have been recognized that forest-based industrial development could not be initiated quickly. Either a larger feasibility study containing a number of scenarios should have been instituted first, followed by a testing of the various techniques, or initial testing of the forestry establishment was needed first, within a more flexible scenario, followed by industry feasibility studies based on the existing possibilities of the type of plantations that could have been established. In hindsight, the second option would have been the most suitable - thereby avoiding the controversy inherent in the strategy. Either option, however, involved a much longer time frame and slower investment than was acceptable to either GOMP or the Bank, albeit for different reasons[6/].

29. In brief, overambitious desires for quick development were allowed to override pragmatism and technical factors. In the event, this was compounded by both changes in senior officials within GOMP, thereby reducing support for the strategy approach, and political power changes which undermined strategy support completely.

C. Technological Transfer

30. Underlying and compounding these problems of project design was the volume of cross-country technological transfer required. While the Bank is

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6/ GOMP officials wanted quick action while it was within their power/control to demonstrate a particular strategy. The Bank wanted to demonstrate rapid financial support to India's forestry sector.

now more aware of the sort of problems likely to arise in this area, nevertheless, details are continuously sought, and this project provides a clear illustration. Such transfers involve not only the problem of getting the initial staff in the country to accept, understand and willingly implement technological innovation, but also of obtaining widespread institutional and political acceptance to permit technical staff to operate in an implementable environment.

31. At the managerial level there are examples of necessary procurements being persistently delayed or totally prevented: (a) by a chain of administrative officials questioning the technical justifications, and thereby the necessity, of individual specified items, particularly when to the uninitiated an apparently reasonable alternative may exist; (b) by well placed technicians who disagree with overriding concepts; and (c) by lack of understanding of the justifications for such matters as the release of foreign exchange. These sorts of problems were evident in other decision chains approving or allowing use of transferred technology.

32. At the micro-level the problems are illustrated by the performance of nursery management. Although the production of good seedlings is a prerequisite of any plantation or forestry trial program, the project nursery was consistently allowed to produce seedlings of poor quality or of a type unsuitable for the conditions in which they were to be planted. Nursery management refused to accept that alternative techniques were available and were suitable for the cultivation of stronger seedlings. Lack of receptiveness/understanding resulted in failure to take adequate measures to identify potential disease problems or even to take measures that could prevent disease occurrence. As a result when, as happened, disease entered the

nursery early in project life, the disease was either not identified or management neglected to notify higher authority until it had reached such proportions as to be obvious that disease was present, by which time it was too late[7]/. No attempt appears to have been made to take fully appropriate measures to eliminate the disease in the nursery, even after tentative specific disease identification in 1979. Neither visiting Bank staff nor the consultants on their annual visits were informed of the suspected presence of disease, its tentative identification, or its subsequent confirmation[8]/. Consequently, visiting specialists continued to stress problems of weak planting-out techniques and subsequent maintenance as the main reason for deplorable seedling survival rates.

33. It is inconceivable that senior management was unaware from an early stage of these potential problems, which poses the question as to why specialized scientific assistance was not sought earlier than 1979, and why, after tentative identification, knowledge was retained within a relatively small coterie. In the absence of other explanations, it appears probable that senior officials feared that, with the controversy over project strategy, (paras. 22 through 25), wide disclosure of information on the problem would result in it being exaggerated and used in counter arguments.

7/ Although the specific disease (Machrophomina Phaseolina) was not scientifically and officially confirmed (and presence reported in internal project documents) until September 1982, it had been identified as a probable disease, in 1979 by visiting research staff. However, certain project officers had suspected the presence of some unidentified disease much earlier as a contributing factor to the extremely low seedling survival ratio in the plantations. As the disease is present in even the earliest plantations (symptoms can become apparent after a few weeks or only after as much as ten years) it is probable that initial nursery infection occurred very early in the project period.

8/ Even a fairly quick review of international scientific papers relating to the culture of the tree species involved reveals the dangers of this particular disease - a disease fairly common throughout the world, maintained by legumous plants.

34. In addressing the transfer of technology problems, the foregoing scenario points to a need to pay particular attention to the possibility of closeminded professional jealousies and the reluctance to seek (or accept) outside advice, negating what may seem to be a relatively simple transfer.

D. The Tribal Dimensions

35. The potentially adverse effect of a future major project on the tribal populations added yet another dimension, both in itself and in respect of its timing within project design (para. 26), i.e., the sequence called for (a) proving of plantation techniques; followed by (b) an interim forecast of different scenarios for industry; and then (c) a study of the tribal population related to those scenarios; and finally (d) a serious industry feasibility study. This logic can only be followed, however, by accepting a much longer time frame in initiating the major developmental investments.

36. Within the time frame constraints and interdependent, interlocking potential problems present in this project design, it is doubtful (even in more favorable circumstances than those which ensued) if the tribal studies could have been meaningfully carried out. Nevertheless, some lessons concerning this type of effort emerge from project experience.

37. The need for tribal studies was identified, but in the absence of sociological expertise from the Bank, both the design of the component and its implementation were left to the Indian authorities. This is understandable given the amount of social scientific expertise in the country; however, in hindsight, it involved the mistake of not at least providing some firm guidelines that would ensure that the studies were implementable.

38. Assigning responsibility to the State for both study design and implementation resulted in institutional struggles within the State for control of both. Further, the absence of clear guidelines from outside the State created professional tensions between technicians and sociologists. Although the sociologists had little concept of the broad strategy of the technical assistance project itself, their perception was that, unless they controlled implementation of the study, fair considerations of their findings would not be taken into account by major decision makers. As indicated earlier, there was division amongst technicians, but in the main their perception was the reverse: they feared that implementation responsibility by sociologists would bias findings towards the exclusive maintenance of tribal culture rather than to the technical and economic considerations.

39. Thus institutional and professional impasses were created at the State level, thereby negating any serious implementation of the component. In hindsight, this could only have been avoided by a design of the component which: (a) laid down specific guidelines or, at a minimum, gave more detail than the broad brush intent contained in project documents; and (b) assigned major control of the design and implementation to (preferably different) pre-identified authorities outside the State, not necessarily outside India. In brief, some type of patronage was needed above the level of the different vested interests within the State.

E. Staff Appraisal Report

40. A staff appraisal report was not prepared, which is understandable given the substantial staff time invested in the late 1974 sector study and the subsequent 1975 project identification/preparation mission. It must be recognized, however, that the mission, while in the field, was not addressing

the technical assistance project[9]/ - an approach which was only subsequently adopted. Only the President's Report was issued as an official document; the detail within it was clearly inadequate to describe and analyze what, in practice, was a very sophisticated, ambitious endeavor, although in superficial terms, the project may have seemed relatively simple and, in Indian context, covered a relatively small investment.

41. In audit's view the failure to produce an SAR (or an equivalent document) contributed to project failure, for two principal reasons. First, the preparation of a detailed official document (involving a review process) probably would have forced to the surface some of the inconsistencies in design (para. 26); within the components, it would have forced a reasoned, detailed explanation of each technical requirement. Second, such a document would have provided implementation staff with a more specific set of terms of reference and provided institutions with a better understanding of the project design.

42. The processing procedures adopted by the Bank were apparently influenced by desires to keep a reasonable ratio between staff input time and the relatively small size of investment involved. Similarly, senior management questioned the need for the modest amount of supervision carried out in the early stages. This suggests that senior management did not appreciate the potential complexity of this type of technical assistance[10]/. In turn, this may have influenced the (very limited) degree of supervision felt to be necessary by the Central Government.

9/ Even at the time of mission departure from India, GOMP documents record an envisaged rapid investment including inter-alia the planting of 42,100 ha within five years.

10/ A similar approach was adopted for the Pakistan: Hazara Pre-Investment Project (Credit 755-PAK). Initial evidence suggests similar results, as in this project.

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PROJECT COMPLETION REPORT

INDIA - Madhya Pradesh Forestry Technical Assistance Project

(Credit 609-IN)

May 31, 1983

INDIA

MADHYA PRADESH FORESTRY TECHNICAL ASSISTANCE PROJECT (CR. 609)

PROJECT COMPLETION REPORT

I. INTRODUCTION

A. Sector Background

1.01 India's forest lands account for 23% of the total land area and cover some 75 million ha, but the sector contributes only 1.5% of GDP. Current estimated roundwood production is about 150 million m3 of which only some 30 million m3 comes from state managed forests. Projected domestic roundwood requirements, by the year 2000, are nearly 290 million m3 consisting of 225 million m3 fuelwood and 65 million m3 industrial roundwood, of which 13 million m3 will be coniferous. About 45% of coniferous production would be used for pulpwood. Continuation of existing plantation programs should lessen the supply gap for industrial hardwood, and provide about half of the coniferous roundwood demand. However, pulpwood and especially fuelwood would continue to be in short supply.

1.02 India's strategy for forestry development in the Fifth Five Year Plan (1975-80) reflected two priorities; firstly, to develop commercial (production) forestry programs to supply the growing needs of the domestic wood products industry (particularly pulp and paper), and secondly, through social (community) forestry to supply fuelwood, fodder, small timber and minor forest produce to rural populations.

B. Project Inception

1.03 The possibilities for industrial development in Bastar District of Madhya Pradesh had been studied for over a decade and were focused on the potential for setting up forest based industries, particularly pulp and paper production. Following an extensive Bank forestry sector review in 1974, a Bank mission visited India in May 1975 in order to assist the Government of Madhya Pradesh (GOMP) in preparing a forestry project suitable for external financing and concluded that, although the potential was great, major questions remained unanswered in relation to the extent of the resource base, the size and configuration of the industry, potential markets and the logistics of harvesting large volumes of timber and the integration of tribal way of life into the envisaged development. In addition, in the absence of species and provenance trials, a sound technical basis for establishment of large scale plantations was lacking. As a

result, the mission recommended a technical assistance project as a necessary prerequisite to further development. In August 1975, GOI requested IDA financing for this purpose.

C. The Project at Formulation

1.04 The proposed project comprised the following:

(a) a site assessment survey to select suitable areas for clearfelling and reforestation within the three catchment areas proposed having regard to the physical limitations of the forests, the requirements of Tribals and environmental considerations;

(b) a feasibility study to provide a basis for determining the location, size and configuration of forest industries that could be established, taking into consideration the integration of Tribals in future development;

(c) a study of Tribals to work out plans to ensure their integration with future forest and industrial development;

(d) research trials (of species, provenances and silvicultural methods) and pilot plantations to establish the techniques of large scale reforestation with fast growing species;

(e) provision of four specialists for forestry operations and training of five selected local personnel through fellowships abroad; and

(f) a pilot/training logging unit to develop suitable systems to supply the large volumes of wood that would be needed for the new industries.

D. Project Area

1.05 The area selected for study was the Bastar District of Madhya Pradesh. The District covers some 3.9 million ha of which an estimated 2.2 million ha is forest land. The project focused on three specific areas in the Bastar District, namely Jagdalpur, Barsur and S.W. Bastar which were chosen as the natural "wood catchment" areas for the supply of material to three potential industrial sites.

1.06 Population density was low at 15 persons/km2 and 68% of the population was Tribal. Tribal life is inextricably linked to that of the forests, which supply fuel, timber, fruits, roots, bamboo for weaving and cattle grazing. The economy was not monetized, barter being the main method of exchange, and employment prospects in the area were poor.

E. Preparation, Negotiations and Approval

1.07 The project was prepared by a Bank mission to India in August 1975. The President's Report and legal documents were presented to the Board in December 1975.

1.08 Principal assurances obtained during negotiations were:

(a) from GOI:

(i) that a Committee would be established, comprising the MPFDC, the Madhya Pradesh Industrial Development Corporation and the State and Central Departments of Science and Technology to evaluate proposals for future projects with a view to ensuring environmental protection.

(ii) that GOI would ensure the financial viability of the Madhya Pradesh State Forestry Development Corporation (MPSFDC), since the latter would be the implementing agency;

(iii) that MPFDC would be allowed to import seed directly from suppliers and;

(b) from GOMP:

(i) that a Committee would be set up at the State level within three months of credit signing for monitoring the progress of the project and for coordinating the execution of the feasibility study and the study on Tribals; and

(ii) that the forest resources inventories for planning industrial development and the harvesting program in specific catchment areas would be completed within nine months of credit signing.

1.09 A condition of effectiveness was that the Project Manager from MPFDC had been appointed on terms and conditions acceptable to the Association.

1.10 The estimated total project cost was US$8.21 M with taxes or US$7.55 M net of taxes, including US$2.0 M in foreign exchange. IDA's Credit to GOI amounted to US$4.0 M on standard terms.

II. PROJECT IMPLEMENTATION

A. Effectiveness

2.01 The Project was presented to the Board on December 30, 1975; the Credit Agreement was signed on February 26, 1976 and became effective on May 15, 1976. Project completion was extended for 12 months and the project closed on March 31, 1983.

B. Implementation Schedule

Site Assessment Survey

2.02 The site assessment survey was carried out by the project staff in two stages. The first step, a reconnaissance survey, was implemented in the period 1976 to 1978. The survey identified major site types and their broad geographic distribution. Based on this information, a detailed site assessment survey was carried out for areas selected for plantation establishment. The survey was completed on time and was of good quality.

Feasibility Study

2.03 Sandwell Management Consultants (SMC) was awarded the contract to ascertain the feasibility of establishing forest-based industries in the project area. SMC finalized a draft report in October 1979 and a review meeting was held in Bhopal to discuss the findings with GOMP, GOI and IDA in November 1979. SMC identified two alternatives. The first proposal consisted of an 100,000 TPA writing and printing paper mill integrated with an 100,000 m3 (r) sawmill and; the second was based on a 50,000 TPA dissolving pulp mill integrated with a 100,000 m3 (r) sawmill. Financial and economic analyses carried out in the report ranked the second alternative as significantly better than the first. However, SMC supported the first option which provided for better utilization of forest resources in Bastar. GOMP, on the other hand, preferred the dissolving pulp mill alternative as this required lower capital investment and complied with GOI's policy of manufacturing low energy based fibre for the domestic textile industry. In addition, GOMP expressed reservations regarding SMC's estimate of the bamboo supply. SMC finalized the report following the review meeting but without making any substantial changes in the draft version.

Research and Trials

2.04 The overall performance of project management in carrying out research and establishing trial plantations was not very successful. Out of the 25 research experiments initiated at nursery level only 9 yielded some results. In the field only a few experiments yielded results; the majority were abandoned due to poor seedling survival. During the period

1977 to 1982 project staff attempted to establish 1,423 ha of plantations, primarily using Pinus caribaea. Details of plantation establishment are given in Table 1. According to a systematic survey carried out in 1982 the average survival rate was only 36%. About 34% of the planted area had between 0-20% of trees surviving, 26% of the area with 20 to 40% survival rate, and in the remaining areas the survival rate was above 40% (Map No. 2).

Table 1: PLANTATION RESEARCH AND TRIAL ACTIVITY

Particulars	unit	Years 77-78	78-79	79-80	80-81	81-82	82-83
A. Plantation Trials							
i) Current Year plantation	ha	44	150	270	383	250	-
ii) Cumulative Total	ha	44	194	464	847	1097	-
B. Research Plots							
i) Current Year Establishment	ha	25	20	35	4	10	-
ii) Cumulative Total	ha	25	45	80	84	94	94
C. Other Plantations							
i) Current	ha	18	47	84	137	40	-
ii) Cumulative Total	ha	18	65	149	286	326	326
D. Research Experiments							
i) Current	no.	10	14	24	-	6	-
ii) Cumulative Total	no.	10	24	48	48	54	54

2.05 Project records show that the total number of seedlings planted over the period of 1977-1982 was almost three times the amount required to stock the area under normal conditions indicating a high mortality rate. A number of factors were responsible for this poor performance:

(a) Seed

The source of seed supply, especially for pines, varied from one year to another. 1/ In addition, seed grading was not undertaken in spite of visible variations in the quality of seed.

(b) Seedlings

The Project failed to develop appropriate nursery techniques to ensure the production of uniform, good quality and vigorous planting stock. The lack of seed grading, improper watering, fertilizer application and sanitary practices caused significant mortality and variations in size among surviving seedlings. Despite this, all nursery stock was used for planting out. The Forester-in-Charge of nursery operations consistently declined to cooperate with the Plantation Officer and practically none of the findings of project related research were adopted in order to upgrade nursery techniques. In addition, nursery seedling stock developed pathological problems (mainly due to lack of sanitation) which further reduced the viability of the planting stock and consequently, increased the rate of mortality in the plantations.

(c) Plantations

In addition to poor planting stock, the plantations suffered from poor site preparation, lack of effective weeding and prolonged planting periods.

2.06 Although the Project made provision for the procurement of appropriate equipment for mechanized land clearing, site preparation and subsequent weeding, project management declined to procure such equipment and hired old machinery which had neither the power nor the attachments to do the job effectively. Consequently, most of the plantation area was not weeded in time and young plants were suppressed. The result was high

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1/ The project initially procured pine seed from an European supplier. The second year shipment failed to germinate. The project authority accused the supplier of supplying bad seed; the supplier claimed that the seeds did not germinate because of mishandling by the quarantine authority. From the third year on pine seed was procured from Australia.

seedling mortality and restricted growth. Attempts to restore stocking failed largely due to the late infilling. Moreover, in 1979 Project Management, with the assistance of a pathologist, identified a massive attack of the fungus Macraphomina phaseolina (Charcoal Root Rot) on pine seedlings. This further accelerated the mortality of seedlings planted out. It should be noted that the existence of the fungus was neither mentioned to Bank staff nor to consultants during their subsequent visits to the project area. Although high mortality rates had been observed by both consultants and Bank staff, this was attributed to poor seedling quality and suppression of growth due to weeds. 1/

2.07 Field observation of surviving patches of plantation indicates that pines can grow satisfactorily within the project area provided they are planted on suitable sites, using good nursery stock, and are properly maintained. However, from the experience gained from this project it is now apparent that before entering future large scale operations additional work is required to perfect nursery techniques, site preparation and subsequent tree maintenance so as to ensure seedling survival and vigorous growth.

Technical Assistance

2.08 Two short term foreign consultants, one to advise on research and one on field operations, were engaged in the first year of the project. Both consultants visited the project five times in the course of project implementation and submitted detailed reports to the project authorities following each visit. The research consultant gave assistance to project staff in designing the layout of experiments and trials, both within the nursery and in the field. Furthermore, the consultant provided technical guidance to staff in analysis of data collected. However, failure of field plots and latterly the discontinuation of field observations reduced the effectiveness of earlier work. The task of the consultant for field operations was mainly to assist the project authority in designing and implementing land clearing, site preparation and plantation maintenance systems. The reluctance of the project authority to procure appropriate

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1/ This was the first recorded incident of Macrophomina phaseolina attack on pines in India. According to pathologists, pathogene can exist within a plantation without inflicting any significant damage, if stands are maintained properly. Moreover, by fumigating potting mixtures with formaline or methyl bromide the pathogene can be controlled effectively.

equipment and to appoint the logging consultant 1/ left very little scope for this consultant to perform effectively.

2.09 The following table gives the details of the consultants' field visits. This was in general accord with the requirements spelt out in the President's Report.

Table 2: FIELD OPERATION TIME OF SHORT TERM CONSULTANTS

Visit No.	Commenced	Completed
1	Nov. 28, 1976	Dec. 23,1976
2	April 3, 1978	April 17, 1978
3	Jan. 3, 1979	Jan. 20, 1979
4	Feb. 1, 1980	Feb. 17, 1980
5	Aug. 5, 1981	Aug. 30, 1981

Pilot/Training Logging Unit

2.10 The Madhya Pradesh State Forestry Development Corporation (MPSFDC) invited proposals for a logging consultant in 1978. The "Swedforest Consulting A.B." was selected among the seven responding firms but the MPFDC Board declined to award the contract due to a disagreement among board members regarding the advisability of clearfelling natural stands of Sal (Shorea robusta). It was only in late 1981 that the Board finally decided to award the contract in order to satisfy IDA's condition for extending project closing by one year. By this time GOMP had already decided not to go ahead with large-scale clear felling of natural forests. Nevertheless, a report offering alternative logging systems was produced by the consultant.

Tribal Study

2.11 During appraisal, IDA acknowledged the special status of the tribal population living within the proposed project area. A study to assess the likely impact of the proposed development program on the socio-economic conditions of Tribals and to recommend means for their integration with development proposals were included in the project and US$100,000 was allocated for this purpose. The Tribal Research and Development Institute of the Tribal and Harijan Welfare Department of the

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1/ Mechanized land clearing is an immediate follow up to tree harvesting. Consequently, logging and land clearing need to be redesigned and implemented as an integrated operation.

Government of Madhya Pradesh was given the task of carrying out the study. IDA reviewed the TOR of the task group and field work started in early 1979. A report was completed in early 1980 but was found not satisfactory by GOMP and consequently not released. 1/ Although IDA continually emphasized the importance of the study, all attempts to carry out a new study or to discuss the existing report failed.

Training

2.12 The project provided for five fellowships. This was later modified to seven although only five were utilized. 2/ The seventh candidate (the Logging Superintendent) was transferred to another post in government and the fellowship was cancelled. Project personnel who went on tour comprised the following: Project Manager, Senior Research Officer, Research Officer, Site Assessment Officer (Inventory), and Site Assessment Officer (Soils). The following table gives the details of the training program.

Table 3: STUDENTSHIP PROGRAM

Staff Title	Duration	Countries Visited
Project Manager	Aug.-Oct. 1979	Australia, Fiji, Kenya, U.K., Turkey
Site Assessment Off.(I)	Apr.-Aug. 1979	Canada, USA, U.K. Germany
Site Assessment Off.(S)	May -June 1979	U.K., Holland, Italy
Sr. Research Officer	Aug.-Oct. 1979	Australia, Fiji, Kenya, Zambia, Turkey, U.K.
Research Officer	Aug.-Oct. 1979	Kenya, Zambia, U.K.

1/ IDA staff, from private discussions learned that the report was neither in line with TOR nor based on field data. It was prepared by the head of Tribal Welfare Department who was opposed to the proposed development.

2/ One fellowship was reserved for a new staff member to be transferred to the project. However, the appointment did not materialize.

Civil Works

2.13 The Credit Agreement shows an amount of US$ 550,000 allocated for civil works; however, neither the Credit Agreement nor the Project Report mentions details of the civil works to be constructed.

2.14 A complex consisting of 42 staff houses, one large office building, one guest house, one senior and one junior staff hostel, and one permanent nursery with a water supply system and a large nursery shed were constructed under the project. In addition, two fire control towers equipped with radios and 18 kilometers of road were constructed.

C. Reporting

2.15 Quarterly and annual reports were received regularly. Generally, the contents and quality of these reports were adequate. Project accounts, as a part of MPSFDC, were audited annually; however, IDA has not received any audit reports for the last three years (1980, 1981 and 1982), a default of Article 4.02 of the Project Agreement between IDA and MPSEDC. In addition to regular reporting the Project Staff prepared and published 27 papers/reports (Annex 1).

D. Procurement

2.16 During implementation, the Project authorities procured a road roller, two trucks, a tanker truck, nine inspection vehicles (jeeps, cars, pick-ups, etc), seven farm tractors, various nursery equipment (cultivators, ploughs, trailers, pumps, generators, etc). The procedures followed were acceptable to IDA and conformed with the legal agreements. However, heavy tractors and appropriate attachments necessary to carry out land clearing and mechanical weeding were not procured despite persistent requests from Bank staff and the consultants. The Project authority rented locally available tractors which had neither adequate power nor appropriate attachments to do the job.

E. Cost

2.17 According to project accounts the total cost of the project, as of the closing date, was Rs. 50.7 million, corresponding to US$ 5.7 million at the 1975 exchange rate. The following table gives project expenditures by years.

Table 4: PROJECT COST BY YEARS /a

Year	Estimated RS'000	Actual RS'000	Actual/Estimate %
1977	15,967	1,368	9
1978	40,291	7,784	19
1979	52,880	23,584	45
1980	61,852	33,823	55
1981	73,149	41,818	57
1982	-	46,964	64
1982 /b	-	50,719	69

/a Financial Year ends June 30.
/b Total Cost at Closure of the Project.

F. Disbursement

2.18 Over the project implementation period of six years US$3.0 million was disbursed and the balance of US$1 million cancelled at project closing. This amounted to 75% of appraisal estimate. The following table gives the actual disbursements as compared to the SAR estimate.

Table 5: ACTUAL AND ESTIMATED DISBURSEMENT BY CATEGORIES

(US$ '000)

Disbursement Categories	Total IDA Credit	Actual Disbursement	Disbursement %
1 a) Overseas Consultants & Studentship	1400	1232	88
b) Study in Part E of the Project	100	40	40
2. Seed and Equipment			
a) Directly procured	300	32	11
b) Procurred locally	320	407	127
3. Civil Works	550	423	77
4. Local Staff Salaries & Wages	1100	883	80
5. Unallocated	230	-	-
Total	4000	3017	75

G. Institutional Performance

2.19 The Project started off well. All posts were filled without delay, 1/ consultants were engaged on time to undertake the feasibility study and to provide technical assistance. However, procurement of heavy equipment, hiring of logging consultants and completion of the Tribal Study were constantly delayed. Consequently, the project management, constrained by lack of equipment and political support, failed to implement the Project in accordance with the agreed targets and standards.

2.20 Project administration was satisfactory. The project manager succeeded in maintaining good relationships among staff, which is commendable given the remoteness of the project area and the relative seniority of the staff concerned. However, little technical guidance was given and control over the technical performance of staff was lacking, particularly

1/ See Annex II.

in respect of field operations and timely processing of research data. This lack of technical direction not only reduced the effectiveness of the consultants, but also adversely affected the application of research findings to field implementation.

III. THE BANK'S PERFORMANCE

A. Appraisal

3.01 The President's Report (which is the only project document) was derived from the IDA Preparation Report. However, there is no documentation on the files to relate cost figures given in the two documents; therefore details associated with the cost summary, given in the President's Report, are not available. Furthermore, neither the Preparation nor the President's Report included a detailed program for civil works. Although a certain amount of flexibility in the design of a technical assistance project is necessary, this should be limited to research and development related activities and not to easily definable items such as civil works.

3.02 The existence of the Tribal population and the magnitude of socio-economic problems likely to arise as a result of any development scheme were adequately highlighted in the Preparation Report. Given the overriding importance of seeking a practical solution to these problems, the design of an appropriate Tribal study should not have been left to the implementation phase of the project. However, in 1975 the Bank's experience in projects involving such situations was limited and guidance to staff is now available in the form of OMS-2.34 issued in February 1982.

B. Supervision

3.03 Eight supervision missions visited the project during implementation, however, no supervision took between December 1980 and February 1983. Following each supervision mission, letters summarizing the main findings and indicating corrective action required were sent to GOI and GOMP.

3.04 The main issues raised during supervision were; poor seedling quality, poor maintenance, failure to procure heavy equipment, lateness in awarding the contract to logging consultants and failure to carry out the Tribal study.

3.05 Successive supervision missions since December 1976 had given the project "Trend" 1 for performance rating. Apparently, assurances obtained from the government to take corrective action following each supervision

were treated as a positive trend. The Bank maintained this optimism while waiting for GOI to decide on the future of the Project during the period of 1980-82. This was based on the following factors:

(i) an industrial development program had been identified as a result of the feasibility study;

(ii) a preparation report for resource utilization and development had been prepared and given to GOI;

(iii) the main objective of this first forestry project was to identify a development program compatible with national goals and consequently it was considered acceptable that the government take its time in resolving issues;

(iv) the Project entity was still intact and field operations were continuing; and

(v) a positive decision on the conversion of natural forest to pine plantations would lift the restrictions put on procurement of equipment, implementation of the Tribal study and hiring of logging consultants.

3.06 Therefore, the alternative, to close the Project at this stage, was not considered. However, when the Bank learned of GOI'S decision not to continue with the establishment of pine plantations in March 1982, the Project Officer immediately recommended closing the project prematurely, or at least, restricting disbursement. IDA management chose the latter recommendation and GOI was informed that IDA would not disburse for further procurement of equipment.

3.07 Poor technical performance was clearly identified as early as 1980. The Bank could have suggested the introduction of resident consultants to correct the situation. However, considering the state of the Project progress and prevailing issues at that point, it would have been doubtful that GOI would have seriously considered such a proposal.

IV. CONCLUSIONS

4.01 The Technical Assistance Project achieved its objectives to the following extent:

(a) the site assessment studies yielded positive results. The methodology developed during the course of project implementation can be used for predicting site quality prior to planting;

(b) the feasibility study confirmed that integrated forest industries could be established in the Bastar area if forest resources were intensively managed; and

(c) established the practicability of growing exotic pine species as a replacement for natural forest, provided good tree husbandry practices were followed.

4.02 However, the project failed in attaining other key objectives:

(a) nursery and plantation research and trials produced few conclusive results due to high tree seedling mortality rates and indifferent nursery practices;

(b) the project failed to develop appropriate logging, site preparation and mechanized systems mainly due to reluctance in procuring suitable equipment and engaging logging consultants; and

(c) though a large number of Tribals were employed in all project activities and trained to use/repair/service equipment, the project failed to conduct a satisfactory Tribal study and hence was not able to formulate a program for their long term integration into the development proposals.

4.03 A controversy developed around the impact of resource development on the welfare of Tribals and continued over a period of three years and ultimately (in 1982) led GOI to abandon the proposed development. The initial policy of the Government to use the proposed development scheme as a vessel for the advancement of Tribals, changed during the course of the project under the constant opposition of certain pressure groups. In the end, the socio-political preferences of the Government superseded its socio-economic aspirations.

4.04 The project is a good case study illustrating how a technically sound and economically viable development scheme may be rejected by Government as a result of socio-political considerations.

4.05 Experience gained from the implementation of this project indicates that:

(a) the unsatisfactory performance of the Project in carrying out plantation research and trials was partly due to lack of equipment and, poor technical guidance and performance of staff. Therefore, resident rather than short term consultants, at least in the early stages of Project implementation should have been provided for the introduction and development of new techniques; and

(b) a large housing and office complex was constructed under the project in anticipation of a large follow-up program. In the future, such an investment should be minimized until such times as the outcome of the project is assured.

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MADHYA PRADESH FORESTRY TECHNICAL ASSISTANCE PROJECT (CR. 609)

PROJECT COMPLETION REPORT

List of Project Publications

No.1(1977) Seth, VK & Saxena OP - Bastar a challenge to pulp and paper technologists and industrialists - 10 p.

No.2(1977) Seth, VK & Saxena OP & Tandon, MN- Exploitation and replenishment of locked up forest raw material in Bastar 19p. & appendices.

No.3(1977) Singh, DP, Tiwari MK & Chauhan VS - Some Characteristics of Bastar Labour in relation to large scale forestry operations with special reference to bestumping - 10p. & appendices.

No.4(1978) Tandon MN - Interim report on forest resources of area under MP forestry Technical Assistance Project in Bastar district, part-29 and appendices, part 2, 179p.

No. 5 Singh DP (n.d.) Power chain saw Vs. Axe and hand saw comparative rate of cross cutting - a pilot study, 4 p. and appendices.

No.6(1978) Tandon,MN - Aerial photographs - a tool for obtaining area information for forest based industrial feasibility studies in Bastar, 19 p. and appendices.

No. 7 Kharche, ML & Chauhan VS (n.d.) - Response of Pinus caribaea seedlings to P & K fertilisers, 9 p.

No. 8 Kharche ML & Mishra AK (n.d.) - Evaluation of potting media with special reference to Pinus carbaea, p.7.

No.9(1978) Puri KD (n.d.). Application of schientific management and modern techniques for raising forest plantations p.10.

No. 10 Puri KD (n.d.) Nursery practices for tropical pines p. 14,

No. 11 Chauhan VS - Reconnaissance forest soil survey and site assessment report of Jagdalpur, Barsur and West Bastar industrial catchments.

No.12(1978) Introducing MP Forestry Technical Assistance Project-Bastar.

No. 13(1978)Kohli VG & Tandon MN - Pulp wood stock volumes and stock weight study in Bastar, p.13 23 appendices.

No.14(1978) Tandon, MN - Practical experience with sampling of hardwood for pulping trials in Bastar, p. 18 + 5 appendices.

No.15(1978) Chauyan VS & Kaiser MK - A case study - change in land form in forest area with Special reference to the drainage catchment of Anchiyari river of West Bastar industrial catchment. p.8 + 4 appces.

...2

No.16(1978) Chauhan VS - Quantitative analysis of the land form in Jagdalpur industrial catchment covering experimental pine plantation areas, p. 8 + 2 appces.

No.17(1978) Chauhan VS & Sharma RK - Soil sequence - an investigation with special reference to Kurandih sites, p.30.

No. 18 Chauhan VS - Detailed soil & site survey report of four Kurandih Units. 133 p.

No. 19* Chauhan VS - Detailed soil survey and site assessment report of four Kurandih units, 150 p.

No.20(1978) Bhargava AK, Sharma RK & Chauhan VS - Time and cost study of field procedures of detailed soil survey. 5 p. + 4 appces.(Their report includes a separate page section on aerial survey in soil survey).

No.21(1979) Tandon MN - Report on study tour abroad under studentship programme of M Forestry Technical Assistance Project,Bastar, MPSFDC Bhopal p. 126 + 4 annexures.

No.22(1979) Kharche ML - Report on Study tour under the studentship programme of MP Forestry Technical Assistance Project, Bastar India (A Study of nursery and plantation techniques in Zambia, Kenya and United Kingdon as compared with the project of pines in India). 151 p.

No.23(1980) Puri KD - Pine plantations in Bastar Project techniques and other related activities, p. 25.

No.24(1980) Singh DP - Towards improved logging efficiency in tropical forests of Bastar - 7 p.+5 tables & annexures.

No.25(1980) Modi VK - Operational efficiency in nursery work -method for filling polypots efficiently in Kurandih pine nursery- use of polypot filler in the pine nursery - a cost and time saving device p.6.

No.26(1982) Terminal Report on Research Component of MPFTA Project, Bastar - Kharche ML, OSD(R).

No.27(1982) Dr.Jamaluddin & et al & staff of MPFTAP - Specific Disease intensity survey report - Charcoal root rot disease of Pinus Caribaea caused by Macrophomina phaseolina in the pine plantation of Bastar, Jagdalpur.

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MADHYA PRADESH FORESTRY TECHNICAL ASSISTANCE PROJECT (CR.609)

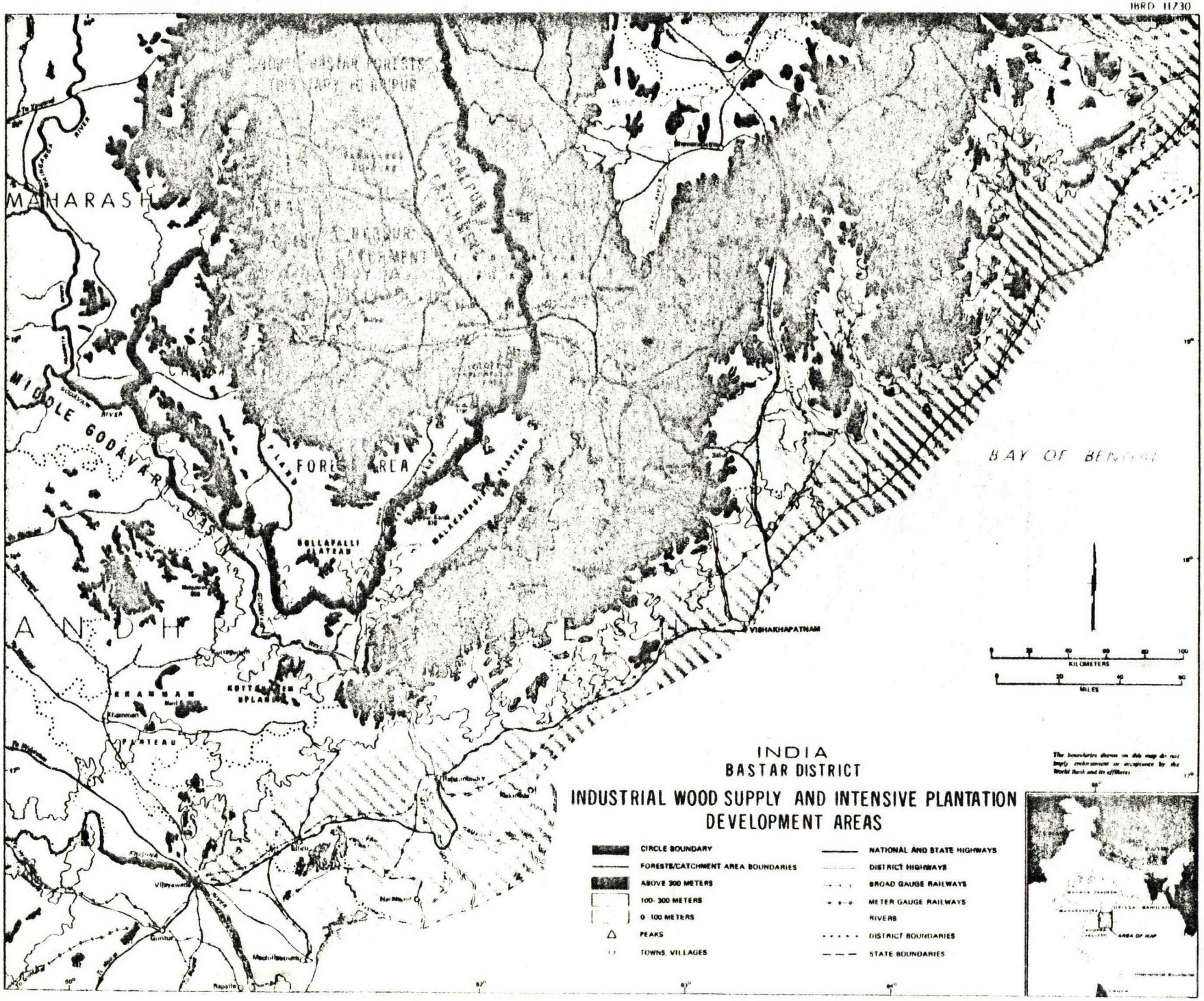
PROJECT COMPLETION REPORT

Project Staff Structure

Title	Number	Date of Appointment
A. Senior Staff		
- Project Manager	1	3/02/1976
- Senior Research Officer	1	3/17/1976
- Logging Supervisor	1	4/03/1976
- Site Assessment Officer	1	3/17/1976
- Research Officer	1	3/17/1976
- Assistant Manager (Accounts)	1	3/17/1976
- Workshop Foreman	1	8/07/1978
- Deputy Manager (Construction)	1	11/02/1978
- Deputy Manager (Accounts)	1	8/21/1979
- Assistant Manager (Accounts)	1	9/28/1979
B. Junior Staff		
- Sub Engineer	16	
- Storekeeper	1	
- Field Assistant	32	
- Field Men	53	
- Office Superintendent	1	
- Senior Stenographer	1	
- Stenographer	3	
- Accountants	8	
- Records Clerk	10	
- Laboratory Assistant	2	
- Droughtsmen	3	
- Driver	11	
- Machine Operator	6	
- Gardener	2	
- Messenger	3	
- Chowhidar	6	
- Watchmen	3	

- Assistant Machine Operator 2
- Logger 1
- Cleaners 1

IBRD 11730


MAHARASH
MIDDLE GODAVARI
FOR EA
BULLAPALLI PLATEAU
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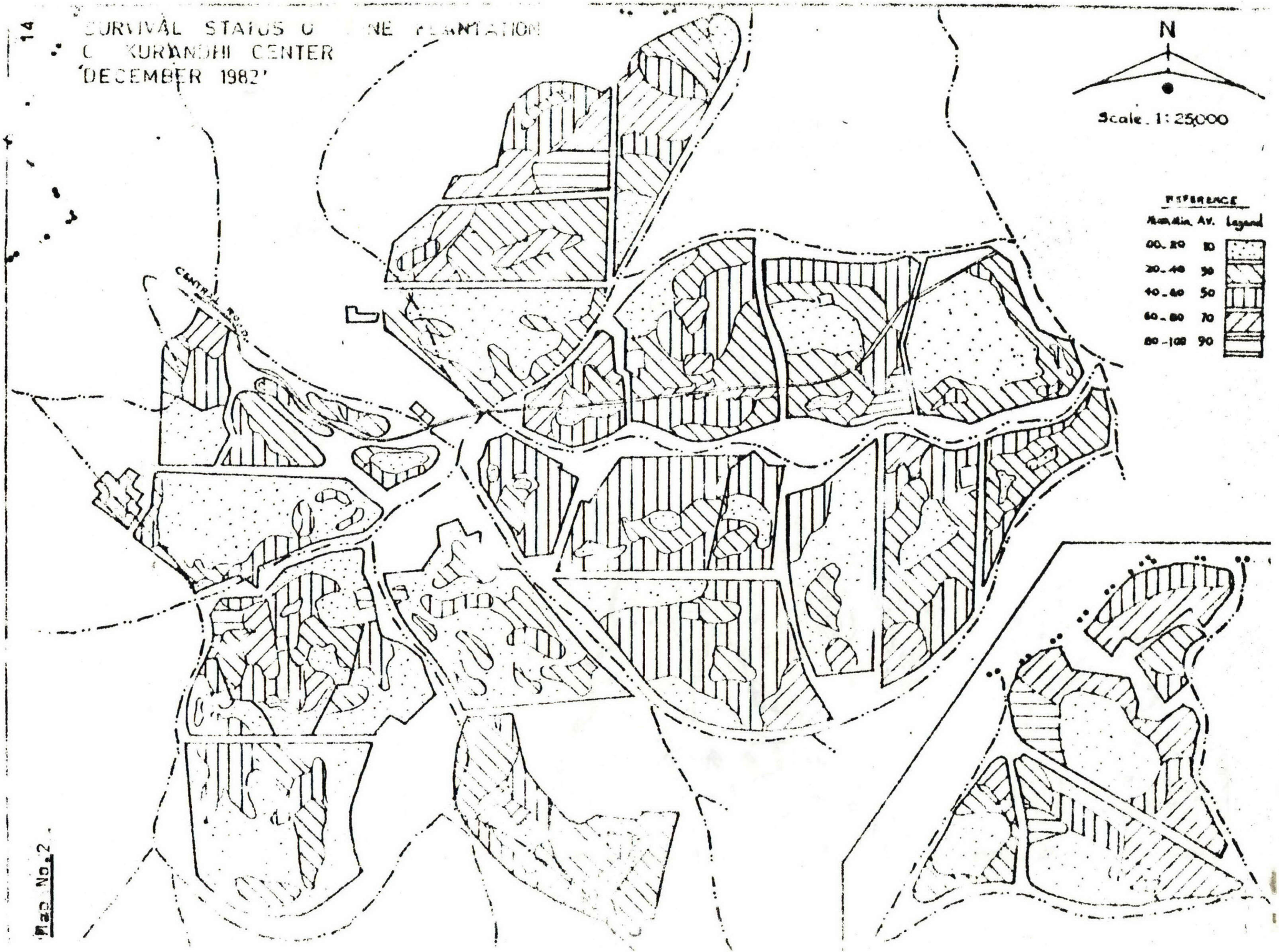
VISHAKHAPATNAM
KRAMAM
PLATEAU
KOTTAGUDEM UPLANDS
Villyawada
Guntur
Machilipatnam
Repalle
KILOMETERS
MILES
INDIA
BASTAR DISTRICT
INDUSTRIAL WOOD SUPPLY AND INTENSIVE PLANTATION DEVELOPMENT AREAS
CIRCLE BOUNDARY
FORESTS/CATCHMENT AREA BOUNDARIES
ABOVE 300 METERS
100-300 METERS
0-100 METERS
PEAKS
TOWNS, VILLAGES
NATIONAL AND STATE HIGHWAYS
DISTRICT HIGHWAYS
BROAD GAUGE RAILWAYS
METER GAUGE RAILWAYS
RIVERS
DISTRICT BOUNDARIES
STATE BOUNDARIES
The boundaries shown on this map do not imply endorsement or acceptance by the World Bank and its affiliates
AREA OF MAP


14
SURVIVAL STATUS O NE PLANTATION
C KURIANDHI CENTER
'DECEMBER 1982'
N
Scale 1:25000
REFERENCE
Annulin Av. Legend
00-20 10
20-40 30
40-60 50
60-80 70
80-100 90
CENTRAL ROAD
Plan No. 2