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Download date: 05. May. 2019
Bamboo housing in Costa Rica.  
(La construcción de viviendas de bambú en Costa Rica)  
Dr. Jules J.A.Janssen.  
TUE BKO 94.08  

Report to U.N.Habitat Nairobi, dealing with project UNCHS COS/90/005.
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Note: in this report the term "project" is used, but the future foundation is meant as well, unless otherwise stated.
Introduction.


My counterparts are Guillermo Gonzalez, Roberto Picado and Lucila Robles.

My function has been described by the project (in the budget, line 11.01) as "Supervisor Tecnico" (en Construcción y Cultivo); the terms of reference appear at the end of this report. The contract dealing with this visit has been signed by UNCHS/Habitat in Nairobi on July 11th, 1994.

For my next visit (the fifteenth and last) an agreement has been made for the period Sunday February 19th till Thursday evening March 2nd, 1995. Terms of reference as usual.

In a meeting with the Embassy, mrs. Christina van Kooten raised the idea that I should prepare a short overview of this project from the very beginning till the end in 1995, to be presented at the end of February 1995 during a lunch for staff of the Embassy, UNDP, MIVAH and the PNB, as well as later on for the Ministry in the Hague.

\cr94d.
Chapter 0. The foundation.

During my last visit in February/March 1994, I wrote some pages in my report which show my concern in those days. Now it seems all problems are over. The new government has nominated some new members of the Junta Directiva, and on Monday July 18th, 1994, they have nominated the actual director of the project, Ana Cecilia Chaves de Soto, as director of the foundation.

This nomination is the best which could happen for the project. Important is that her nomination is long lasting, while representatives from ministries can be replaced after new elections which result in a change of government.

Parts of the project which are self-supporting will be transferred to the foundation as soon as possible. By mid 1995 all parts has to be self sufficient and have to be a part of the foundation. For the department for Investigación y Desarrollo (INDE) this will remain a problem. If the project would build much more than 1000 houses annually, then some support could be given to INDE from the extra profit. But that is only on the long term. PNB is making a list of possible subjects to be covered by INDE.

Personally I am very glad about the relaxed atmosphere at the project, and the flow of new ideas, now the tension is over. A period of serious problems is behind us.

Some remarks to be taken into account:
- Ana Cecilia has to make clear carefully if she signs a letter in her function of director of the project or of the foundation.
- As soon as the foundation will request a considerable part of her time, her salary has to be divided between both institutes.
- The plantations have to be transferred from the project to the foundation. Do the government and ICE agree?

The actual government is strongly in favour of bamboo and of the project. I recommend the project to take the advantage of this political support, and to be sure to grow in the next four years into such a strong commercial enterprise in the field of social housing, that nobody can deny this foundation any more. One can hardly expect that after the elections in 1998 political support will remain that strong.

An evaluation is going on as well. Evidently, at the end of such a big and long-lasting project such an evaluation is normal, to show to the Dutch Government the received funds have been spent well, and to show the PNB can continue on its own without support. I have seen a proposal for an evaluation, made by external consultants, requesting an amount of USD 47 000. I reject this proposal, not only because it is very expensive but also because most of the proposed studies already have been done by staff. On the other hand, staff and Roberto Ottolenghi have prepared a proposal which sounds very well. It meets all demands, it includes involvement of staff of MIVAH which is very wise, and it can be executed with as few external consultants as by any means possible.
Chapter A. The plantations.

The staff has prepared a scheme how many culms can be cut from the plantations in the next years, at a mean rate and at a high rate. Summary:

<table>
<thead>
<tr>
<th>year</th>
<th>no of culms, mean rate</th>
<th>no of culms, high rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>31,000</td>
<td>45,000</td>
</tr>
<tr>
<td>1995</td>
<td>95,000</td>
<td>153,000</td>
</tr>
<tr>
<td>1996</td>
<td>211,000</td>
<td>321,000</td>
</tr>
<tr>
<td>1997</td>
<td>361,000</td>
<td>488,000</td>
</tr>
<tr>
<td>1998</td>
<td>512,000</td>
<td>650,000</td>
</tr>
</tbody>
</table>

These predictions look reliable. Naturally, bamboo is a plant, and growth of a plant is a natural process, depending on many factors which cannot be influenced by man. A plantation is not a factory.

The Figueres government is stimulating the project to raise a 2000 hectares more bamboo plantation, to contribute considerably to the solution of the housing problem. The project has submitted a proposal for this, showing that in ten years time from now enormous amounts of bamboo could be cut, and consequently thousands of houses could be built.

According to the suggestion made by mr. Figueres on February 21st, small farmers will grow bamboo on their places, for their own use, and for sale to the project. Consequently in the future the project has to raise factories all over the country to use these culms. Further study is needed on these new factories and the balance between offer and demand. The use of bamboo for irrigation could be an option as well; research in Brazil is going on about this option. But by all means, the project has to study carefully the consequences of such initiatives; a too fast growth can kill any promising company.

The problem is that this government is in favour of much more bamboo, but before any new plantation is ripe, we will face another government. And who knows their feelings about bamboo? Therefore the project has to take the chance and to face the challenge of the positive influence of the actual government, but at the end the market will decide on the long term how much the share will be for bamboo and bamboo housing.

The price at which a bamboo culm is being sold by the project, is a matter of discussion. Actually the project charges 55 colones per metre for an unpreserved culm and 75 for a preserved one, which equals US $ 0.35 and 0.48 resp. A mean cross section of a culm is 3000 mm². With these data, the price per m³ becomes US $ 116 and 160 resp., to be compared with timber: US $ 220 and 290 resp. This means bamboo really is competitive with timber. (Recent information from India says unpreserved bamboo costs US $ 0.27 per metre, which is only a little bit less. In Bangladesh, in 1991 the price was US $ 0.50 per metre).

But this argument only holds as long as the bamboo is being used as such. However, as soon the bamboo will be processed, e.g. to laminated bamboo, the price has to be much lower. In that case bamboo is only a raw material, and not an end prod-
uct: the price of bamboo should be lower than US $ 80 per m3, which means less than $ 0.24/metre culm or colones 37/metre.

Another item is this: the production of a plantation always will show an unbalance with the demand for production of houses, furniture and the like. The result is that the project has to design each year a workplan, how many culms are needed for housing and furniture, and the remaining quantity of culms has to be sold, on the local market for the support of roofs, and also on the export market, e.g. Miami. Later on bamboo should become a raw material for industrial use.

Some minor items about plantations:
- At this moment quite some thousands of thin culms have to be cut in order to allow for space for thick culms to grow. (This is normal in a young plantation). But the project is unable to sell them as culms or as furniture. The foundation will be able to act commercially in October. Between now and then the project can cut and preserve the culms. The project has to check the capacity of the preservation plant, and has to organise a keen quality control, especially when entering the market with such a new item like bamboo for roof support.
- The staff has developed a small machine to make bamboo-fibres, to be used as a fertilizer, or to protect young bamboos from the weed, or as a material for industrial products.
- The Chinese mission in Limon has raised objections against Guadua and in favour of Phyllostachys. I agree completely with the answer given by Jorge Gutierrez.
- The staff has written a note about the carbon dioxide which is absorbed by a bamboo plantation: an adult plantation absorbs 40 tonnes carbon dioxide per hectare annually. This helps in air pollution control.
- In my report of August 1993, item A4, I recommended a study of the future use of caña brava, in view of the idea for 60 hectares of plantation of this plant. This still has to be done.
Chapter B. The preservation.

In fact there is hardly any news: production is going on very well. Just one remarkable fact. The project has given full information about preservation to the bamboo project in Indonesia, completely free. But this project has printed manuals with this information, and they are selling these, with profit. Such is life. The person that came to collect this information was such a young and innocent girl.

Chapter C. The panels.

A student from Eindhoven University, Janine Parisius, has spent her traineeship with the panel factory. Her report gives recommendations how to improve the production. These are being taken into account, resulting in an increase of production capacity.

For the construction of houses in the peninsula of Nicoya, which is at a far distance from the factory, the project plans a portable panel factory. This solves production and transport problems this year, and it allows for a continuous growth until the second factory in Arenal can be built.

Houses with a hundred percent bamboo structure still are the future. Panels made from bamboo only are ready to be tested at the project, in a similar way as has been done some years ago with the panels with a timber frame that are being used now.
Chapter D. The construction of houses.

In the workplan for the year 1994, originally the construction of 862 houses was planned. Due to some delay, e.g. in the administration of subsidies, and a change in government policy, this number is going down to 632 if we include the month January 1995. This does not look very positive. However if we check how much houses will be started in the period August till November included, the outcome is 430 houses in four months time. This means the project is able to proceed during this period at a rate of 1300 houses annually. This meets the demand of at least 1000 houses a year.

Another item is how much bamboo culms are available this year and in 1995 and 1996. A summary is as follows.

<table>
<thead>
<tr>
<th>Year:</th>
<th>1994</th>
<th>1995</th>
<th>1996</th>
</tr>
</thead>
<tbody>
<tr>
<td>culms, mean rate</td>
<td>30 640</td>
<td>94 630</td>
<td>211 000</td>
</tr>
<tr>
<td>no. of houses at 150 c/h:</td>
<td>205</td>
<td>630</td>
<td>1 400</td>
</tr>
<tr>
<td>(c/h means culms per house)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>no. of houses at 40 c/h:</td>
<td>766</td>
<td>2 365</td>
<td>5 275</td>
</tr>
<tr>
<td>or:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>culms, high rate</td>
<td>45 000</td>
<td>153 000</td>
<td>321 000</td>
</tr>
<tr>
<td>this equals no. of houses:</td>
<td>300</td>
<td>1 020</td>
<td>2 140</td>
</tr>
<tr>
<td>annual plan: no. of houses:</td>
<td>630</td>
<td>1 200</td>
<td>1 200</td>
</tr>
</tbody>
</table>

A house with 150 culms per house is made with 100 percent bamboo; with 40 culms only the panels are made from bamboo. From this table one can see that in 1994 and 1995 much timber and caña brava is needed; only in 1996 enough bamboo will be available for house construction with bamboo only. (Compare the underlined figures). In my opinion 150 culms is an estimation at the very safe side; 120 culms will be enough for a 100 percent bamboo house of 46 m².

Another document gives the outline for the maximum possible house production for the years 1996 till 2001, and the real planning:

<table>
<thead>
<tr>
<th>year</th>
<th>maximum</th>
<th>planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>1409</td>
<td>1200</td>
</tr>
<tr>
<td>1997</td>
<td>2410</td>
<td>1450</td>
</tr>
<tr>
<td>1998</td>
<td>3415</td>
<td>1750</td>
</tr>
<tr>
<td>1999</td>
<td>4286</td>
<td>2000</td>
</tr>
<tr>
<td>2000</td>
<td>5001</td>
<td>2500</td>
</tr>
<tr>
<td>2001</td>
<td>5560</td>
<td>3000</td>
</tr>
</tbody>
</table>

In my personal opinion this conservative planning is wise, because it is good not to grow too quickly. However the project has to define the use of the remaining bamboos.

The project has submitted a document to the government, explaining that with 2000 hectares bamboo plantation extra, it might be possible to build 140 000 bamboo houses in the years 2002 till 2007 included. Such a planning on the long term is needed, but if the government really wants this programme to
be executed, it is quite a challenge. The project will be unable to carry out this programme on its own. Instead the project should train building contractors how to build bamboo houses, after which bamboo has become a familiar building material like bricks or nails. This would be the best for bamboo, but it is still a long way.

In 1993, CIVCO in Cartago has organized a seminar about the technologies and building systems for social housing. An overview in the report from this seminar shows the prices for social houses in Costa Rica. Compared with the most common type, the concrete blocks, the bamboo house is 25.9 percent cheaper.

The future of the bamboo house seems prosperous: it is a good and cheap house. However the project still is vulnerable: it has only one single client: the government, because a change in the policy of the bono familiar could kill the project. During this government this is unlikely, but in other countries such changes in policy have occurred. And we might learn as well from the actual problems with BANHVI.
Chapter E. Other subjects.

E.1. The programme for sustainable development.
In my opinion bamboo as an industrial material should play a role in this programme. During my stay I discussed the next proposal with the UCR, the ITCR, the PNB and the Dutch Embassy.

-UCR: glue made from local and natural resources because glue is the key to all uses of bamboo; wafer-board and roofing sheets made from plastic waste and bamboo fibres.
-ITCR: laminated bamboo sheets for walls etc., and doors and windows from long fibres.
-both: scientific and applied technical research on the said subjects. Physical and mechanical properties till product is ready on laboratory-scale.
-PNB takes all results to bring these from the lab to the industry: feasibility, try-out factories, marketing. Staff and students from EUT involved.
-Industries participate in the development of products which are feasible. At the end they will have to pay a share of their profit to the UCR/ITCR/PNB; hopefully a part of the one million US could become a revolving fund. Industries preferably local, medium size and no foreign capital.

I recommend the project to participate because this research will be very positive for the future of bamboo in this country and consequently also for the project.

E.2. The region.
It is still a duty for the project to disseminate its know how in the region. I understood that e.g. Panama is prepared to build bamboo houses.

Another item is that this project has to develop itself into the Latin American Bamboo Information Centre, like those in India and China. See my report from August 1993, page 11, par. E.8, where this already has been recommended.

The proceedings from the International Bamboo Workshop in Cochin, 1988, give a report how these centres are functioning.

Project staff is very inventive in raising research items to make better use of bamboo. Examples are as follows.

Roofing sheets, made from plastic waste and bamboo fibres. The amount of plastic waste is enormous. It would be quite a solution if this could be used for the production of roofing sheets. This idea appears in the proposal for the sustainable development. I will check references on this in Thailand or Malaysia.

An system to clean waste in an ecologically sound way, for which a structure of bamboo will be used. At the end of this year the UCR (dr. Pujol) will organize a seminar on solid waste; the best what could be done with the said proposal is to present it at this seminar. I have contacted already Jorge Gutierrez about this.

A proposal for research into fibre-board, in cooperation
with people from Canada, is to be submitted shortly. A strong argument in favour of bamboo-particle board is the growing resistance on the market against the use of tropical hardwood. Some big do-it-yourself supermarkets in Europe are putting advertisements in the journal: "We do not sell any more tropical hardwood". Another argument in favour of bamboo fibre-board is the energy required for production of fibres: making fibres from bamboo obviously requires much less energy than making fibres from a tree. Nobody ever calculated this difference, but it makes sense.

Really necessary is the presentation of the PNB on the next international bamboo congress in Indonesia in June 1995. Evidently the biggest project has to be present there. But who has the funds? In the meeting with UNDP it was agreed that Mr. Muñoz will look for funds with UNDP in New York or in some Indonesian UNDP programme. The last option is a revision of the budget, together with the revision for the costs of the evaluation. Needed is about USD 5000. Strong argument: South-South transfer of knowledge!

E.5. Some general remarks about price calculation: I like to recommend the project for any new item firstly to check which price the market is willing to pay, and secondly to calculate if the item can be produced for this price and with a profit. The other way round will result in waste of time and effort.
Day-to-day report.

Travel Eindhoven-Amsterdam-San José. The driver from the project brings me from the airport to my hotel.

Monday 18th. In the morning meeting with staff, to discuss the agenda for this week. They provide me with reports about the evaluation and other subjects. The afternoon is used for study of these reports, prepare meetings and making appointments.

Tuesday 19th. In the morning a meeting with Ana Cecilia Chaves and Lucila Robles, about the foundation, the evaluation, the workplan 1994, etc. In the afternoon first a meeting with Ana Cecilia Chaves and Arturo Venegas about the plantations and ideas for research (roofing sheets and waste treatment, see item E.3). Next a meeting with Rafael Bejarano and Arnoldo Vindas about the workplan 1994, the production of panels, etc.

Wednesday 20th. Morning: meeting with UNDP, about the foundation, the evaluation, the participation of the project in the bamboo congress next year, and other items. All are covered in this report. Afternoon: report to staff about the outcome of this meeting.

Thursday 21st. In the morning I study the proposal for a marketing and feasibility study of bamboo fibre board, and I write my comment about this. The afternoon is used for study, reading, and making notes.

Friday 22nd. Meetings with UCR and ITCR about the programme for sustainable development. The PNB will participate as NGO.

Saturday 23rd. Study, reflection and writing. Determine on the structure of this report.

Monday 25th. National holiday. Prepare meetings of this week.

Tuesday 26th. Collecting missing data at the project. Asking information about items which are not clear yet. At the Dutch Embassy meetings with Christina van Kooten and Jan Bauer. In the afternoon I meet the minister of housing, mr. Edgar Arroyo C. He is very positive about bamboo. Reports to staff about these meetings.

Wednesday 27th. Letter to parties about bamboo proposal in programme for sustainable development. Draft of recommendations, and of report. Lunch with staff and Oscar Arce, from ITCR, who was involved in the very beginning of this project.

Thursday 28th. I present my recommendations to the staff of the project; they agree. Report writing; I provide staff with a draft of my report to clear any misunderstandings. In the evening I leave from the airport.

Friday 29th. Travel to Amsterdam and to Eindhoven.
Recommendations (in English)

1. The project should continue in developing itself into a commercial enterprise. The purposes must remain: cheap social housing, job creation, and industrial products, all with bamboo.

2. The project should prepare a sound evaluation, to show to the Dutch Government that the received money has been spent well, and that the PNB will be able to continue on its own. The evaluation proposal, written by PNB and Roberto Ottolenghi, is a sound proposal. The evaluation can be done by staff of PNB, with involvement of MIVAH, and as few external consultants as by any means possible.

3. The project should continue in developing a 100 percent bamboo house. The future use of caña brava has to be studied.

4. More coordination within the project is urgently needed. It happens quite some times that a person or department is writing a letter or making a calculation, while another person or department should be involved, but is not. I have seen examples of this in the past years, and even last week. It is no use to mention names; it is a structural problem.

5. The project should spend more attention to disseminate its know-how in the region, e.g. to Panama. The project should develop itself also to the Latin-American Bamboo Information Centre. I have already recommended this several times.

6. Project staff should spend much more attention to publicity, e.g. by publishing articles in journals, and e.g. by again a seminar. Also an old recommendation. I know staff is busy, but it is ridiculous so may good reports are present here, while nobody on the world knows anything about this. And the last seminar was in august 1992!

7. The PNB should participate in research for the industrial use of bamboo, together with UCR and ITCR, in the programme for desarrollo sostenible. Recommended since march 1993. Now even more urgent: one cannot grow 2000 hectares bamboo without knowing what to do with it.

8. The Project should be present at the International Bamboo Workshop next year in Indonesia. I recommend UNDP to look for funds for the cost of travel etc. It is not done that the biggest bamboo project all over the world would not be present, to show the people from Asia how to run a project. South-South transfer!.
Recommendaciones (en Espagnol).

1. El Proyecto debe continuar desarrollándose como una empresa comercial. Los objetivos deben permanecer iguales: viviendas baratas, creación de trabajo, productos industriales, todo con bambú.

2. El Proyecto debe preparar una evaluación sólida para demostrar al Gobierno de los Países Bajos que el dinero donado por ellos fue bien utilizado y que el P.N.B. podrá mantenerse solo cuando se termine la donación.
   La propuesta de evaluación escrita por Roberto Otholenghi y el P.N.B. es una muestra. La evaluación podría ser hecha por personal del P.N.B., junto con el MIVAH y el mínimo de consultores externos posible.

3. El Proyecto debe continuar desarrollando una casa 100% de bambú. El futuro de la caña brava tiene que estudiarse.

4. Mayor coordinación entre el Proyecto es urgentemente necesario. Sucede que algunas veces una persona o departamento escribe una carta o un cálculo mientras otra persona o departamento debería estar involucrada, pero no lo está.
   He visto ejemplos de esto durante otras visitas y ahora también. No vale la pena mencionar nombres, es un problema estructural.

5. El Proyecto debe dedicar más atención a diseminar la tecnología en la región por ejemplo hacia Panamá. También debe convertirse en el Centro de Información Latinoamericano de Bambú.
   He recomendado esto varias veces.

6. El personal del Proyecto debe darle más atención a la publicidad, publicando artículos en periódicos y con otro seminario.
   Otra recomendación vieja. Sé que el personal está ocupado, pero es ridículo que con tantos informes buenos que se preparan nadie en el mundo conoce nada acerca del trabajo realizado. Además, el último seminario fue en agosto de 1992!

7. El P.N.B. debe participar en la investigación para el uso industrial del bambú, junto con la Universidad de Costa Rica y el Tecnológico en el programa para el desarrollo sostenible.
   Esto fue recomendado en marzo de 1993. Ahora es mucho más urgente: no se pueden sembrar 2000 hectáreas de bambú sin saber que se va a hacer con él.

8. El Proyecto debe hacer acto de presencia en el Taller Internacional de Bambú el año entrante en Indonesia. Le recoméndé a PNUD que buscara fondos para viáticos y transporte.
No es posible que el proyecto de bambú más grande del mundo no esté presente para enseñarle a la gente asiática como manejar un proyecto. Transferencia Sur - Sur!

Terms of reference.

1. The project has to provide the supervisor with all information which he is likely to need, as soon as it appears. The project has to provide him with other information upon request.
2. The supervisor has to study this information and to report to the Dutch Embassy in San José, PNUD in San José, UNCHS in Nairobi and the Ministry in The Hague.
3. The Embassy and PNUD are entitled to ask the supervisor to check certain points.
4. The supervisor is entitled to give advice and recommendation on request or on his own initiative.
5. If the project turns down such an advice or recommendation, the project and the supervisor should try to arrange an agreement. If they fail the project has to submit the arguments for the refusal to the Embassy and PNUD, who have to decide.
6. The duty of the supervisor is limited to the agreed working time: a week and a half in Costa Rica (two weeks including travel time) plus one week in Holland, each six months. The duty of the supervisor is also limited to the technical aspects of the project (construction, cultivation and preservation); the cultural and social aspects do not belong to his duty.
7. The project has to provide the supervisor with the usual office and travel facilities.