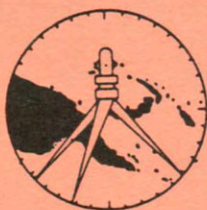


THE JOURNAL
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of Papua New Guinea



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THE ASSOCIATION OF SURVEYORS OF PAPUA NEW GUINEA

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THE JOURNAL
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Editor: Michael J. Larmer
P.O. Box 372, PORT MORESBY

TABLE OF CONTENTS

Page 2.	Editorial	
3.	Thoughts on ASPNG Future	Francis Posanau
8.	An Overview of Lands & Physical Planning Departments Current Methods & Future Management Techniques	A. Doug Miller
23.	Land Tenure & Land Use Rights	B.M. Narokobi
30.	Datum Transformations with Special Reference to Papua New Guinea	P. Done
44.	Walter Cuthbertson	
46.	Wild Heerbrugg PNG Trust Fund	
50.	Minutes of 27th AGM	
54.	Congress Photos	
59.	Presidents Message	
64.	The LIS Concept in Developing Countries: Papua New Guinea as a Case Study	D.N. Pullar
110.	The Unstable Environment: Rates of Movement	P. Done
128.	Letters	
132.	In Memoriam	

EDITORIAL

We apologize for the time span that has elapsed between our 1985 Journal and this one but your new Editor thought it best to wait until after the Congress and AGM in case anything of significant import emerged from these gatherings.

Alas it did not. This is not to say that the Congress was not a great success or that the Papers were not of a high quality and well presented, the point is that as far as is known no resolutions emerged from the Congress which could be put by the Association to the Government of the day in the interests of better land law for Papua New Guinea.

Land associated problems have long been recognized as being a significant constraining force on the social and economic development of PNG. For twenty seven years the Association of Surveyors of Papua New Guinea, arguably the strongest Professional Association in PNG and certainly the Group most Qualified to give advice on Land matters has talked about reform and on occasions has put representations to Government. Unfortunately we have not been forceful enough and have been unsuccessful in instigating any important changes for the better in the system.

The ASPNG ought to be a force to be reckoned with in this country but apart from the President Francis Posanau and one or two others there is a lamentable lack of commitment by the Members to make our voice heard in the appropriate places for the good of the Profession but more particularly the good of the Nation.

The Editor of this Journal and the Editor of the Quarterly Newsletter Doug Miller would welcome a lively response from Members on this and other matters which affect the Association of Surveyors of Papua New Guinea.

EDITOR

THOUGHTS ON ASPNG FUTURE

I was asked by the editor to contribute something for this Journal. Among the list of suggestions, I was asked if I could write something on the future of our Association - I decided to take up the challenge.

What I have attempted below are ideas which are aimed specifically at our recent members and also to generate a bit more discussion. It is my hope that we generate positive response to strengthen the development of our professional Association. On this basis I hope to hear from our members what their thoughts are in our coming newsletters and Journals.

There is one thing that I am convinced of and that is we cannot achieve certain change, goals or standards unless we all play our role and take up responsibilities. And in this changing technological era, our Association will have to implement certain changes to play a more meaningful role of providing better services to our people, which is our ultimate objective.

1. Membership

Currently our constitution provides for six (6) grades of membership, namely, Hon. Fellow, Fellow, Corporate member, Associate, Technical Associate and student. This would seem adequate to cater for any category of "Mr. Mak" we might have in the future.

I am concerned however about the number of graduates who are not members. I was just wondering whether we are doing enough to promote the Association. For those of us who are in responsible positions both in government and private industry I feel we should be encouraging and advising our new graduates to apply for membership.

Is our membership fee (Member K30, Associate and Tech. Associate K15) a bit too high? For the benefits of our recent members, I understand our current fees have not changed for more than 15 years and in fact at our last meeting in Port Moresby 2 weeks ago the council proposed an increase in our membership fees - due to the general C.P.I increases during these years and the affect of these on prices of materials (items) Association uses.

Also the Association is embarking on a couple of new proposals which will benefit, I am sure, a lot of our members, particularly on training and promotion of our Association. Regional meetings which are proving successful will cost some money to run so as our Journals and newsletters which I understand will cost around K600 per year. I would like to ask all members to support the council's proposal for an increase in our membership fees.

2. Structure of Council

Our Constitution allows us to have 9 Councillors to run the affairs of the Association. The constitution sets out in broad terms some of the powers the Council have, although in some instances, at the Annual General Meeting members direct the Council to take certain actions on some issues. Although at the moment there is no great difficulty in the operation of Council, I feel we could consider some changes.

- i) Since our regional meetings are becoming successful as they provide avenues for our members to contribute and participate in the affairs or running of our Association, I wonder whether we should now consider the possibility of electing our councillors on regional basis.
- ii) Also, council is discussing the possibility of a 2 year term rather than 1 year term at the moment. We thought, for a new Councillor the first year is actually a learning year and therefore I would like to ask members to consider this change. In fact for the last couple of years, we just managed to receive 9 nominations and as a result we never had an election.

3. Communication within our Association

Our newsletters and Journals are providing a good linkage among our members. Obviously there are a lot of space for improvements. I noticed though that despite repeated notice at Annual General Meeting and these mediums, a lot of our members are not contributing ideas or articles. Surely a lot of us would like to hear and know what many of us are doing in our respective areas or what our thoughts are on certain issues.

We all should support our regional meetings. It appears some of us are not participating in our respective regional meetings. I feel most our new members would understand more the systems we operate under and what our Association aims to achieve if we all share our experiences and ideas. Some of our older members should provide the leadership and initiatives as Michael Larmer once said "the more you give to the Association, the more you get out of it." From my experience this is not wrong.

Perhaps each region should appoint a publicity officer. His job would be to provide occasional regional report to our editors or write on specific issues regional members would like to air to the council and other members.

I also would like to suggest that each member should receive Congress papers. I don't understand why we are not doing this at the moment. Our members are entitled to receive these even at some cost. This was also suggested by Doug Miller sometime ago, I understand.

4. Continuing Professional Education

I believe, in this technological age of computer etc, we should place more emphasis now on post-qualification training. The Association should consider drawing up proposals for our members to further their education by holding short courses and seminars.

To achieve or implement this, council should work closely with the surveying industry and especially Unitech Surveying Department.

We should also encourage lectures from other professionals as well as our own members along the line lawyers and accountants have. In places like Moresby and Lae these types of lectures I am sure can be organised and would benefit our members.

5. Surveying Education

As I indicated at the Annual General Meeting in Lae we should support and arrange Post graduate training for our graduates in Australia. As Professional organisation we have a duty to our people and governments to provide quality advice on Surveying matters or policies as well as lecturing at Unitech.

Areas that we should send our graduates to gain training in are:

- i) Master degree in Surveying
- ii) G.P.S. research
- iii) Land Information system
- iv) Photogrammetry
- v) Geodesy etc..

We should also consider sending our experienced members to gain experience in project management and land management to equip them for future senior positions in government and private firms.

Also we all should co-operate in the practical training scheme the Commonwealth Surveyor General Mr. John Sleep is trying to arrange. Our members who are holding senior positions in government and private industry have been asked to submit their ideas on suitable training scheme to Ian Sparks of Arman Larmer Surveys, who is co-ordinating this training.

6. Our Association Relationship with other Professions

We should continue developing our relationship with other allied Professions. In particular we should work closely with our CASLE colleagues or bodies. This is essential if we are to provide effective professional services to our communities. At the same time we must not lose our identity in this process. I feel this is important. In Australia I understand they have "Australian Council of Professions". I am not too sure whether this type of body would be ideal for Papua New Guinea. I don't think our Association should initiate such body in Papua New Guinea.

7. Association Relationship with Government & Public

It appears to me we have not been able to establish a satisfactory communication system with Ministers and Senior Public Servants. In this Journal there are couple of issues for example that we would like to discuss with the Government to tighten some of the loopholes in existing laws and to clarify certain policies, even to the extent of us providing some policy guidelines, for example on land registration system etc.

However this channel is difficult and perhaps some of our members might like to suggest some ways to improve our contact. I wonder, going through the Chamber of Commerce might be a good idea.

We have received the Texas 16mm film. Last weekend at the second Highlands regional meeting held in Goroka, this film was shown and our members were impressed by it.

I will be bringing it to Lae for our 18th October Council Meeting and wish to show this to our councillors. I wonder whether Unitech would be where we could store this film. As I indicated in our newsletter, this film was given to us as a gift from Texas Surveyors Association, United States of America.

We have also made a short film with "Skul Bilong Kisim Piksa", here in Goroka and I plan to show this in the third Highlands regional meeting in Mendi next April. If this is acceptable then we might get a copy and send it to Unitech as well to be shown to High School Students and so on. Mr. Surveyor Pilia Wami is starring in this short film.

8. International Affiliation

We should continue to pay our CASLE Membership as we definitely are benefitting from this body. Also we should support Australia's plan to establish a branch of FIG in Asia and Pacific Region. Once again if we play our role well in these international organisations I cannot see any reason why our Association and members cannot gain benefit by our membership of such International bodies.

9. Awards and Prizes

Charles Ofoi was the first recipient of the 'Best Engineering Project' submitted to the Surveyors Board. Shortly we will consider awarding prizes to the best cadastral project submitted and it is hoped that this will stimulate a bit more interest from our cadets. Charles will be sent K50 plus a certificate which he can keep. (The certificate is still being drawn up and any interested members who wish to send suggestions on the actual layout of this certificate can contact me or Ian Sparks).

10. Codes of Ethics

As discussed at the Forum, I would like to propose to the Council that it is now necessary for us to review the Codes of Ethics. A lot of the sections or articles will not change, but we might like to consider amending one or two sections to fit into Papua New Guinea situation and times.

Conclusion

As I indicated in the beginning of this paper these ideas are meant to bring matters into open, to generate discussions among our members and to create professional vitality which to me is an important element of any professional development.

We must not lose sight of the fact that we live amongst a community of nations in the Pacific and the world. In a lot of ways we are interdependent. Our professional development and standards are shaped to certain extent by Professionals around us, that is within the country and overseas.

Finally the advent of fast and changing technology, the introduction of new computers on the market will have a lot of bearing on our professional development. We have to accept these changes, which is a reflection on general modern realities, whether we like it or not. If we don't, we will be left behind and other allied professions will gradually take over some of our traditional roles. Do we wish to see this happen?

Francis P. Posanau
Fellow of Association of
Surveyors of Papua New Guinea

AN OVERVIEW OF LANDS AND PHYSICAL PLANNING DEPARTMENT'S
CURRENT METHODS AND FUTURE MANAGEMENT TECHNIQUES
(With particular emphasis on land boundary surveys)

A DOUG. MILLER : REGIONAL SURVEYOR (NORTHERN)

MADANG : 13 AUGUST 1986

INTRODUCTION

In presenting this paper to this Provincial Works Coordinators Seminar I can safely say that as a Regional Surveyor of some seven years experience I can speak with quite sound knowledge on the on going development of the survey system and its administration. However I have to admit to being considerably less knowledgeable in the various areas of land administration for the reason that I have generally worked with a backlog of work in surveys and this gives only a little time to consider the other aspects of departmental management outside of my responsibility. We are all in that situation in management in government in Papua New Guinea. What I can offer is a follow-up to questions you may raise which I am unable to answer and I can do this through a written distribution to you of answers to such questions after I have further discussed such problems.

MANAGEMENT STRUCTURAL CHANGES AT LANDS HEADQUARTERS

There are two elements of relevance to you as Works Coordinators which makes it necessary to firstly discuss management in Lands Dept. The more relevant is if you make requests are they going to be accepted as relevant requests and where will they fit into the Lands Dept format. The second one is the problem of the delays within Lands Dept. I believe that you will have considerably better response in the future than you have had in the past in both of these areas.

In line with the Wingti government's emphasis of Lands Dept as an economic Department and income generator, a reassessment of the internal structure of the Department has recently been approved. This structural change has been on the way for a long time and has been accelerated by the Wingti government's requirements. The number of divisions in the Department reduces to six, these being Programming (FAS), Finance and Administration (FAS), Land Administration (FAS), Surveys (Surveyor General), Valuation (Valuer General) and Physical Planning (Chief Physical Planner). The change of greatest importance has been the consolidation of the numerous land administration elements of the Dept into one coherent organisation responsible to one First Asst Secretary (FAS). (This revised Land Admin group now includes that titles element of the Registrar General's office). The change of second importance is the breaking of Headquarters functions into Regions thereby making certain staff responsible for the flow of information back to Regions. This gives Provincial and Regional staff the chance to develop a working relationship with HQ staff and gives staff at HQ a special knowledge of a region and hopefully more interest in carrying out their function through more meaningful working relationships. The third change of importance is the creation of the Programming Division.

Please refer to Appendix One for a summary of the structure and functions of the six divisions.

The six divisional heads will meet monthly with the Secretary of Lands and will decide on departmental priorities using a newly developed reporting system. Those priorities will be given to the FAS of Programming who will be responsible

directly for the organisation required to ensure a flow of the selected work occurs.

Please refer to Appendix Two for the standard monthly report format for all supervisory levels of the Department.

The report format requires that a statement be made on the work of the past month and that a programme be given for work in the next month. Failure to carry out the work programmed will result in questions being asked and continual failure to produce results will result in the removal of the particular supervisor from his position. There will be a continuing assessment of staff abilities and emphasis is on continuity of production and priorities in production. The priorities will be those of the government as determined by National Executive Council and will be directly related to the work of other areas of government. It is fully recognised what an embarrassment the Department of Lands has been in the past to successive governments in Lands' inability to respond adequately to matters of prime importance. All minor work either ceases or has no priority under the new management system.

SURVEY MANAGEMENT AT A REGIONAL LEVEL

The trap of a high volume of work with a small staff and a financial budget that will not support the real cost of materials and supplies and travel (camping expenses and air charter) is that the least relevant work tends to be done first because it is least expensive with respect to those costs above. Until June of this year the priority rating of work within the country's four survey regions had been at the discretion of the Regional Surveyor except where a Headquarters instruction had been received with an N or U Suffix on the file number, meaning National importance or Urgent. The introduction of the new monthly reporting system means decisions on priorities made in Lands Headquarters will be channelled back to Regional Surveyors and they will be locked into Departmental priorities and will have less operational freedom. If this also brings more attention to adequate funding on priority work we should see considerable improvement in this Department's response to the work of greatest importance.

If you are not aware of it, all land boundary (cadastral surveys) must be lodged with the Regional Surveyor for checking and approval. This includes all acquisition plans which about two years ago were brought under the Survey Directions. All plans of final survey and land acquisition must receive the Regional Surveyor's signature of approval prior to lodgement in Lands HQ.

Internal management in my own office is based on a work flow sheet which is glued into the inside cover of all survey files, government files on creation, and privately lodged files on lodgement of the work for examination.

Please see Appendix Three for a copy of this flow sheet.

This particular flow sheet is a reworking of my earlier design in use for some years and I am hoping the Surveyor General will see fit to require the use of the new sheet in the three other Regions. Its principal use is to ensure that all elements of record keeping are maintained with immediacy and by the person working at that particular stage of work. Failure to keep up to date records of changes in land descriptions has been a management failure for the past three years in the Madang Office that I took over in February of this year. The other important use is to ensure that adequate advice and prints are circulated to clients or others affected at the time of registration of the survey. This is a fairly new concept for the staff of the Drawing Office at Madang whereas it was routine at Mt Hagen. It is simply good public relations to effectively

communicate with those affected by the progress of the work. The importance of the plan at registration is its legal description and the plan number give a reference that can be used in further correspondence. If a Lands HQ file has been formed over the subject land then that should be supplied to the interested parties plus land investigation instruction number if this is relevant. Certain parties are given copies of survey reports where relevant and further advice on how they should next proceed. The registration of the survey plan is simply a stage in title creation and the further work thereafter is a Headquarters function. The importance of a Regional Surveyor's communication with interested parties at the time of plan registration cannot be underestimated. One of the reasons for delays in replies from Lands Headquarters is that some enquiries are made with a lack of information in them making it difficult to quickly resolve what the problem is and its solution or otherwise. Supply of correct reference information is vital to time saving in this Department at all levels and I would encourage you to be aware of this.

LAND ACQUISITION PLANS AND FINAL PLANS : THEIR RELATIONSHIP TO EACH OTHER THE ROLE OF SAC 20 - FOR SURVEY OF RESERVES

Acquisition plans are a preliminary survey for the purposes of purchase of land. There is a standard Plan form for these which is of A3 size, the title block requires completion of certain items that are not standard on a final survey plan form. Any title resulting from an acquisition plan is noted "Subject to Survey" by the Registrar General's office. There are many such titles and historically the request for a redefinition of such a survey was carried out on request and at Survey Division expense in the belief that we had an obligation to complete survey to a suitable standard to allow the uplifting of the title limitation. Three years ago the scrutiny of Finance Dept over Survey Division required changes in attitudes to charging for surveys and generally the requesting party would be required to pay for a redefinition of an acquisition survey though this is still a fairly grey area in decision making.

I have been instrumental in seeing new procedures developed in the handling of acquisition surveys. I have required that these be carried out as Final Surveys and as soon as the plans are registered a sepia is taken off and an additional title block for the acquisition plan references, information and signatures added plus the Acquisition Plan Number with the base plan number being crossed off. The additional information of land ownership is normally shown in a tabulation block denoting owners and areas. In some cases this may have to be shown on the plan face rather than in a tabulation. The extra drawing work to create the acquisition plan from the final plan is minimal and it would have to be an extensive survey for this work not to be completed in a day. If the acquisition information is on hand on final plan registration, the acquisition plan is prepared immediately and a copy forwarded to HQ with the completed survey file.

This procedure makes the acquisition plan the same survey data as the final plan and it is not able to be disputed as to survey nor able to be requested for future redefinition at government expense. Following this procedure of Final Survey first requires that every effort be made to ensure a rapid flow through of the survey work sequence in order that the acquisition plan is produced as quickly as possible for the use of the District Officer Lands. In the long term the benefit is considerably lower overall expenditure on surveys with a higher efficiency and unlikely dispute on survey matters.

In the more complex surveys, purchase wise, being reserves or roads, it will generally be necessary for the acquisition plan prepared by this method to be passed as working prints to the District Officer Lands in order that he would then have his officers determine land ownership boundaries and particulars which

my division on receipt of information would add onto the office held sepia in order to complete the plan.

With respect to the matter of land ownership the Principal Surveyor of Works on 15 November 1985 wrote to the Surveyor General with copies to Regional Surveyors at Madang and Mt Hagen.

"Under the conditions imposed in Lands Dept Circular SAC 20 Section 6 a Surveyor is obliged to provide sufficient information to enable the accurate plotting of clan boundaries. This, in many cases, can severely effect the cost of survey, especially if the DO Lands is not present to assist. I believe this extra cost to be unwarranted and that boundaries could be plotted by DO Lands at time of conducting the Land Investigation Report. Therefore, unless you direct to the contrary, I intend advising all Surveyors doing work for this Department to identify clan boundaries when the DO Lands is present during the execution of the survey."

I might remark at this time that Dept of Works were intending to have their own investigating officers as part of their Lands cell. My Department has talked of the same but the restructure makes no allowance for it. A step which is more likely is what is in course of occurring in East Sepik Province where the Senior Lands Officer will be known as the Asst Secretary Lands and his staff will contain the District Officer Lands and two other officers, one of whom is a patrol officer and the other is seconded from Primary Industry. There is some resentment at this restructuring in that it is considered to cut across career patterns but I think the long term outlook is a that a wider variety of staff could rise to be Asst Secretary Lands in the Province in the future. East Sepik's move is a direct consequence of their intention to create a Provincial Land Registry and is a vital part of their Rural Development Programme.

In road and easement reserves where a number of ownerships are involved it seems unreasonable to leave the DO Lands without survey support for the task of clan boundary identification. SAC 20 plans in particular may have no ground marks on boundary points as SAC 20 allows calculation of boundary positions from a controlling traverse. It has been necessary in Mt Hagen that a Lands Technical Officer be provided to assist the District Officer's staff in the compilation of the ownership date on the Togoba-Tomba section of the Enga Highway currently being built in stages. Such a Technical Officer in our Departments internal charges system is currently costing us K3.56 per hour. The survey role of these men is generally limited to Rural work and there are times when it is difficult to programme work for them or alternatively difficult to obtain adequate supervision of their work. I would contend therefore that there is definite usefulness in ensuring that technical officers are made available as a matter of course to assist the DO Lands staff irrespective of which Department originated the acquisition request. I had reservations in supplying one of my staff for the Togoba-Tomba work at the time but I now consider my reservations to be wrong. (Survey Division of Lands probably will always have better Provincial representation of a variety of survey staff than Works Dept ever will and this makes it more appropriate that we fill in at all times in assisting the DO Lands.)

At this point I should comment on SAC 20 surveys. This 1981 circular was a result of liaison between the then Asst Surveyor General and the Principal Surveyors of Works and Electricity Commission. The circular SAC 20 was on limited circulation but of necessity has gone further as private consultants have had to make use of its provisions. Basically it cuts right across the Survey Directions to provide a fast track solution to surveys of easements and right of ways for utility purposes etc. It does require a Regional Surveyor's agreement to the use of it and it does allow no ground marking to be made. This is its

principal disadvantage but supposedly one of its cost saving features. I had argued against SAC 20 but have allowed its use where I have considered it appropriate. Principal Surveyor McConell of Works recently had the problem of having to send survey parties out to mark unmarked SAC 20 boundaries as the contractor required to know where the boundaries of the Magi Highway were. This pushed the overall survey cost above what it would have been had the work been ground marked at the time of original traversing. My own concern has been that Lands Survey Division could be placed in the medium to long term in the position of having to peg these unmarked boundaries at our own expense and not at the expense of the originating body.

The most interesting use I have seen of SAC 20 was in the Upper Jimi Valley in Western Highlands and I have related details of that as Appendix Four. Ian Billows, Surveyor, for Works wrote of his work for the Association of Surveyor's Quarterly Newsletter and the Appendix is a copy of that article. Provided good traverse control is placed and remains for the future in these areas where there is only the odd mission, aid post or school as alienated land the survey forms a basis for further land survey work. If the matter of unmarked boundary arises as a problem in 20 years time in these localities I would hope it would be because of the economic development of land which would then make pegging an acceptable cost to government. Both myself and the Principal Surveyor Works are in agreement that localities like this are where SAC 20 has a role to play.

At this time the Survey Directions are due for review and I expect to see SAC 20 redrafted more simply as part of the Directions themselves. I consider that conditions on who bears responsibility for survey of unmarked boundaries in the event of dispute should be written into those new Directions.

THE MAKING OF APPLICATION FOR LAND ACQUISITION

The area of acquisition has been fraught with administrative problems and those problems are more than likely responsible for half of the disputes over acquisitions arising simply because of time delays caused by the inability of Lands Department to adequately tie together the facets of the acquisition process. Middle management in Lands Departments Administrative side has been weak for a long time. In addition a flow of unnecessary work has meant that assessment of priorities has been either difficult or not done. The new management policy of the Dept will assist in solving this kind of problem. On my last visit in June to Headquarters, Land Acquisition section's staff consisted of the OIC and one other. This is unfortunate. I do not presently have details of the restructured Lands Division but I would hope that officers of the former Land Settlement Division could perhaps be moved into this critical area of the Department's operations.

Provincial officers have for a long time wanted to see the Investigation Instruction Registers decentralised to the Provinces in order that direct issue of instruction could take place. I believe the Senior Lands Officers are better qualified to make this judgement than the headquarters staff who are too remote from the source of the request and accordingly do not have sufficient contact to make them aware of the need for urgency which is normal in this work. Requests for acquisition which fail to pass through the hands of the Provincial Lands Officer leave him without knowledge and therefore he cannot assist by giving timely advice. I would strongly advise against you bypassing the Provincial Lands Officer and going directly to Lands Headquarters with applications. You will lose by doing this. Where a province presently has no Provincial Lands Officer representing this Dept I would hope that the restructure would make senior Land Settlement Officers available for this administrative work in the vacant positions.

It usually takes six months to see an Investigation Instruction issued from the result of a request to Lands Headquarters. If a change in location of the register was made to the Provinces I see no reason why the request could not be dealt with in a week and the letter of instruction passed by hand to the District Officer instead of being delayed in the mail. The Regional Surveyor who in certain cases must bear responsibility for survey would at least under such a decentralisation be notified. Notification at the present time to the Regional Surveyor and the Lands Office is by copy of the letter of instruction to the DO Lands. Unfortunately the Regional Surveyor would be lucky to receive a copy of one third of these and the format of the letter and lack of map attachment means he is without adequate information anyway. This particular information problem has been worked at by myself for six years and I have completely failed to have any effective change carried out by Headquarters. At this time the only relevant step that would be of use is the decentralisation of the Registers to the provinces.

The application for land acquisition is presented to the Senior Lands Officer in the form of a Land Application or Tender Form. It should be supported with a covering letter. There is a fee payable.

RESPONSIBILITY FOR THE FUNDING OF THE PURCHASE OF LAND ACQUISITIONS

At the commencement of 1985 Finance Dept issued no funds for land acquisition purposes to the Dept of Lands and that policy continued this year and will continue thereafter. All government purchases of land for acquisition must be funded through the project funds of the particular development. At this time this is a generally unknown development, 20 months since it commenced, because Lands Headquarters have failed to formally notify those most likely to be affected. It is expected however, as the result of this matter being raised at the first ever Lands Congress in June at Loloata Island, that the Secretary will issue a formal statement on this matter.

The position it places Provincial Governments in is that they must provide their own purchase funds. The land on purchase will become state land on lease to the Provincial Government for the purpose required (if it is not road etc). For your interest, private developers of land for agricultural development, if not traditional owners, are in exactly the same position. One such, the developing company of Kobum land at Bundi, (800 hectares for Cardomon spice development in which a Middle East family has a controlling interest) was recently informed of this change in financial policy by myself. I had been forced to take this action because the Madang Minister for Provincial Affairs had gone on record in the newspaper in his involvement on behalf of owners of the land requiring compensation - which simply was not going to happen.

Managing Director, Rex Naug, of National Plantation Management Agency, shortly thereafter made a press release making known the structure of the company, the background to the development and future aspirations. The matter of issue of Land Investigation Instruction is still proceeding some weeks later in what is an important national development.

Let me emphasise again that you must build into project funds the cost of land purchase.

RESPONSIBILITY FOR COSTS OF CADASTRAL SURVEYS

The Finance Departments review of survey work by the Survey Division of Lands was basically carried out through their representative on the Surveying and Mapping Priorities Committee. This committee, three and a half years after formation, effectively no longer operates. Priorities were never discussed. Who paid

for surveys was and that is really why the committee was formed. A sufficient body of knowledge has been built up in the Survey Division as to Finance Departments thinking and the briefest way to cover it is to say that the only survey work done by the division without charge is work on extensive areas of vacant government land, either rural (not common) or urban. Work for specific areas done on request for defined uses by Provincial Government or National Depts is generally charged for and over the past three years this has been at the standard Scale of Fees charges of the Association of Surveyors of PNG.

This is likely to change for two reasons.

The first reason is that I in particular have been concerned at the potentially destructive effect on Consulting Surveyors business of the Survey Division actively competing in the private work sector. One year in the Highlands, when there was no effective private survey service I had my staff carry out 60 small surveys at an average charge (held low in the Scale Fees) of K800. Once a suitable private business had been established I withdrew my staff from the work but I am aware of a case this year where our division tendered a price of K30 000 for work that two private businesses tendered for at K50 000. The division got the work. I would contend that there is every possibility that if adequate forward work planning were done in this division we would find that we simply have no time for private work. As the most experienced of the country's four Regional Surveyors I am aware of how I can create work by analysing situations no one else has looked at and I believe that there is this potential countrywide. We also have some hundreds of Final Order surveys, Court Orders for survey definition for title purposes on land titles lost at Rabaul in the Second World War. The court orders are now in many case twenty years old and witnesses are dying and the work is not been carried out sufficiently fast enough. The net effect of my own representation and the Surveyor General and Asst Surveyor General's thinking is that we as a Division should emphasise the privatisation of survey work wherever possible. An example I am currently working on is my attempt to phase our division out of the Gogol Reafforestation Project and to see funding created for consulting surveyors to take over this work.

The second reason hinges on this Departments placement as an economic department. We are expected to promote the development of the country's wealth through our services. I am not convinced that a cadastral survey division necessarily does that very directly as a lot of its work tends to be a legal function within our land titles system. Effective interaction by Lands Dept in the priorities of government at all levels is what is now going to occur and if that means the survey divisions early involvement in projects then that will happen. It is likely that charges for strictly government required work will be based on the costs over and above wages which have to be paid anyhow. Our onward charges which would have to be paid from your project funds would be the costs of our vehicle hire, special access costs by boat or air, camping costs, costs of cement pegs and other ground marks, plan costs etc. This has not been formalised as operating policy but I do expect it to be made part of our future management outlook.

RESPONSIBILITY FOR SURVEY OF ROAD RESERVES WHERE UPGRADING WORK IS TO BE DONE

This matter will arise where upgrading of roads is occurring and where the contract for the road works requires that the land be defined and surveyed to final survey standard. On 15 December 1983 the Secretary of Lands wrote to the Secretary of Works setting out a joint agreement for operating guidelines on responsibility in this work.

"The culmination of various meetings and exchanges of letters was Circular SAC20 issued in November 1981."....."While SAC 20 removes the technical grey areas of

reserve survey requirements, a number of policy matters must still be resolved before a smooth and trouble free procedure is obtained."

"1 The survey of all reserves containing roads or pipelines constructed prior to this date (meaning November 1981), excluding those for which upgrading work is planned, shall remain the responsibility of the Dept of Lands.".....

"2 The funding of all reserve surveys shall be the responsibility of the Construction Authority.

3 Reserve surveys shall, where possible, be made by the Construction Authority. In those cases where the Authority is not in a position to carry out this survey a request for the Lands Dept to proceed shall be made through the Surveyor General. A guarantee of funding availability shall accompany this request.

4 Where excision of land from leasehold or freehold properties is required the provisions of the Survey Directions 1980 shall apply. In all other cases, where applicable, the provisions of SAC 20 shall apply.

5 Surveys of reserves traversing existing and vacant government land shall be made as soon as practicable after construction has been completed."

These guidelines are the current operating procedures. Works Dept this year is operating through funds now held by Transport Dept and the contracts as let now require that the Engineers determine who the Surveyors should be. The survey comprises both the Engineering Survey and the Land Boundary Survey. If the land boundary survey is an SAC 20 survey prior permission from the Regional Surveyor to use SAC 20 must be obtained.

SURVEYS OF ROADS PURCHASED PRIOR TO NOVEMBER 1981 WHERE UPGRADING IS NOT PROGRAMMED.

For all roads purchased prior to November 1981 I would like to see Regional Surveyors of Lands Dept carry out investigation of these and create a programme for resurvey. Many of these purchases will be a centreline purchase only. Parts of the Highlands Highway e.g. Goroka to Daulo Pass are a 20 metre purchase based on centreline. Where deviation has been made this would require a new purchase and such probably is not being done. Survey would have to determine this initially from ground evidence of old and new routes. In the case of the Highway additional widening to give a reserve of 40 metres would be a requirement of the Survey Directions.

Where a purchase plan exists with side boundaries shown these also require redefinition because patrol officers work leaves a lot to be desired and the ground marking is usually of limited life.

The need for this work to be commenced with a priority rating is more important in areas of high population. On the Highlands Highway population drift to the roadsides has occurred and building development along the Highway is infringing on the land required for the 40 metre reserve. Presently control is only available when survey is being carried out and setback of boundary is asked for by the Regional Surveyor. Taking of this additional land in the future will result in compensation payments for buildings being constructed now.

The non funding of Lands Dept for acquisition purposes means this work has to be treated as a special departmental matter for which funds must be requested as this cannot be delegated to any other Dept. This remedial work is our own responsibility. If this work is done it will give Provincial and National

Roading Authorities firm information on the road boundaries and remove uncertainty as to rights over the land.

CONCLUDING REMARKS

I expect there to be marked changes in our Division's approach to the work of other government divisions especially with respect to priorities and to charges. I have to point out that our Division is presently in the position of having lost in the past year 50% of its expatriate supervisory surveyors. Fortunately in the past three years we have seen enough men trained for these to have registered and many are now holding Provincial Surveyor's responsibilities. They are relatively inexperienced men. I believe the greater number will, in the longer term, be successful but the short term is worrying because of the pressures they face. They have to be administrators, supervisors and they have to carry out field work. They also have to train, as we no longer have the expatriate staff to cover this problem. This is our biggest problem. The next group of our surveyors to register is not going to be ready to do so for 18 months as most men unregistered are those who have been less willing to do their examinations or who have not had the benefit of close expatriate supervision and training. Responsibility rests with these men to carry out their examination projects themselves as it has to be their own work. With difficulty two out of the four projects can potentially be departmental work carried out in working hours but this work has to be withheld from departmental completion pending its going to the Survey Board as the graduate's submission. In the course of dealings with the survey division over the next two years it would be of assistance if officers in government and local government were to familiarise themselves with the structure of their provincial survey office in order that they are aware if these problems exist there. If doubt arises as to the competence of staff please in all cases contact the Regional Surveyor for further assistance and advice.

APPENDIX ONE

DEPARTMENT OF LANDS AND PHYSICAL PLANNING DIVISIONAL/BRANCH ESTABLISHMENT AND FUNCTIONS

1 First Asst Secretary : PROGRAMMING

1. PROGRAMMING 2. RESEARCH

FUNCTION : Develop departmental strategy for land release, land use, and revenue raising, at national and provincial level; coordinate allocation of departmental resources; programme the department with sectoral priorities.

2 First Asst Secretary : FINANCE AND ADMINISTRATION

1. INTERNAL AUDIT 2. FINANCE AND ACCOUNTING 3. PERSONNEL AND OFFICE SERVICES 4. COMPUTER SERVICES 5. STAFF DEVELOPMENT AND TRAINING

FUNCTION : Provide efficient and effective personnel, finance, computing, revenue management, training, and audit control, services, to all divisions of department.

3 First Asst Secretary : LANDS ADMINISTRATION

1. HEADQUARTERS 2. SOUTHERN REGION 3. NORTHERN REGION 4. HIGHLANDS REGION 5. ISLANDS REGION

FUNCTION : Acquire customary land and provide state base title under the Torrens system, for national and provincial lease/leaseback projects; allocate state leasehold land and monitor land dealings, consistent with best use and optimum revenue collection; maintain a computer-based land information system.

4 Surveyor General : SURVEYS

1. CADASTRAL SURVEYS (4 REGIONS) 2. DRAWING OFFICE 3. NATIONAL MAPPING BUREAU

FUNCTION : Produce accurate and up-to-date mapping and survey information and services, to assist the government in the planning and implementation of development projects.

5 Valuer General : VALUATION

1. HEADQUARTERS 2. SOUTHERN REGION 3. NORTHERN REGION 4. HIGHLANDS REGION 5. ISLAND REGION

FUNCTION : Provide valuation for : property on leaseholds for state revenue, rating and land tax for urban authorities and provincial governments, and land acquisitions for development purposes.

6 Chief Physical Planner : PHYSICAL PLANNING

1. DEVELOPMENT PLANNING AND RESEARCH 2. DEVELOPMENT CONTROL AND IMPLEMENTATION

FUNCTION : Provide in rural and urban areas: land identification, organisation of land use patterns, coordination of land development (particularly where there is no specific agency responsibility), to meet the needs of development projects, and to minimise conflicts between land users; information services on population, economic activities, and housing etc., to improve quality of infrastructure investment decision making; improve standards for development.

APPENDIX TWO

DEPARTMENT OF LANDS MONTHLY REPORT

DIVISION

ACTIVITIES FOR MONTH

MONTH ENDING

FOR COMING MONTH : PROJECTIONS

REGIONAL/PROVINCIAL REPORT

CURRENT MONTH TRAVEL
Destination Officer DatePROJECTED TRAVEL
Destination Officer Date

Reason Date

FOR COMMENTS

APPENDIX THREE

SURVEY INSTRUCTION PROCEDURES IN REGIONAL SURVEY OFFICE

This checklist is arranged as closely as possible in order of events, users must interpret variations and mark this record accordingly. The checklist is based on possible events. Those not relevant should be stroked off, those relevant should be blocked in on completion of the action.

FILE FORMATION : Receipt of sufficient information to raise file from ☐
Prepare 2 S F's ☐ Request S F Approval and Number ☐ Request missing file information : from SPLO ☐ from NMB ☐ from HQ D/O ☐ from Prov.Govt ☐ from Client ☐ Prepare Miscellaneous Plan for Preliminary (Portion only) Allocation ☐ On S F No received update S F covers and record system ☐
Issue file to Surveyor ☐ DATE OF ISSUE ☐

FIELD ACTION : Programme likely date of commencement ☐ varied ☐
Actual commencement date ☐ If delayed after commencement, why ☐

Recommencement after delay ☐ Field sketch drawn ☐ Survey report written ☐
☐ Final plan drawn ☐ Plan check by Surveyor ☐

FORWARDED FOR LODGEMENT ☐ PRIVATE WORK LODGED EX ☐

LODGEMENT ACTION : Regional Surveyor's preliminary overview ☐ If file is without S F No have 2 S F's prepared, do file creation checks as above ☐
D/O preliminary noting in pencil, copied for Allocation request and each file ☐
Noting of PSM's received in Register Book (where originally allocated by Region) ☐
Noting of all PSM's rec'd on overlay or other map record, copy noting to S F's ☐ Multiple Use form : for S F No? ☐ for request of allocation ☐ for lodgement receipt by R/S; accepted ☐ refused ☐
Cat Plan Register entry made and plans numbered (may occur earlier) ☐
Staff files recorded completed work list for production and staff reports ☐

ALLOCATION ACTION : Noting cards received ☐ Final noting done ☐
Locality/Name cards noted for named Portions ☐ Note adjacent plans red ☐

EXAMINATION ACTION : Enter probable date of examination ☐ Actual date of examination ☐ (If allocation print has been returned examination may proceed using that print) Draft requisition checked by Regional Surveyor prior to typing ☐ REQUISITION FORWARDED ☐ Reply Due ☐ (3 months)

FINALISATION ACTION : REQUISITION RETURNED ☐ and checked ☐ Any further action ☐

REGISTERED ☐ PRINTING PSM SEPIAS : Regional Office ☐ Prov Surv ☐

PRINTING PLANS : Master file, one ☐ Duplicate file, one ☐ Prov Lands Office, one Sepia/Print ☐ Urban : Regional Planner, one with report ☐
D O Lands for INV INST, with report ☐ Consulting Surveyor, one ☐
Survey Division Client, No of Prints ☐ Covering letter etc to Client ☐
Transmittal to HQ Form ☐ Complete records action Regional Office ☐

MISCELLANEOUS PLAN CREATED BY FILE ☐

LIST LODGED PSM SKETCHES ON FILE ☐

APPENDIX FOUR

SAC 20 IN PRACTICE - IAN BILLOWS, SURVEYOR

2 OCTOBER 1985

With the ever pressing requirement for road acquisition the Dept of Land's survey circular SAC 20 seems to offer a practical alternative to the conventional full boundary marking whilst remaining within the usual survey direction guidelines for cadastral surveys.

During 1984 Dept of Works executed two extensive SAC 20 surveys on the Jimi Valley area of WHP and supplemented the results with some Hasselblad aerial photography. It was hoped to produce boundaries by photography comparable to those computed from normal ground survey methods but as yet results have not been promising. About half of the subject area was 25km of rural access road linking Tabibuga and Koinambe where a variety of terrain heights, road grades, crossfall and thick vegetation offered a test of both ground survey methods and suitability of photography. Due to the circuitous nature of the existing hand built track either an extremely wide or a narrow, many sided corridor were the alternatives to ensure that the reserve straddled the limits of proposed works. In either case conventional "cementing" of boundaries would be labourious, expensive and time consuming; a result indicating that a survey under the provisions of SAC 20 would offer the most expedient solution. In the final analysis a winding, many sided reserve encompassing as little land as possible was chosen, especially with the entire route traversing customary land where food gardens abut many sections of the track.

The ground survey employed a T2 and AGA 110 along a PSM traverse with further iron pins in concrete more closely following the existing route; a total of 28 permanently marked and fully referenced stations. As final construction is to follow a low level engineering survey and design with little or no deviation from the existing route a pickup of the present centreline was sufficient to locate reserve boundaries. At intervals of 200-400 metres dumpies were placed on centreline where radiations from control could be obtained. A pair of bush pickets were then cut and flagged at eye level and using a 30 metre tape, a compass and clinometer traverse was run along centreline between each successive dumpy. The control traverse was connected to major control at regular intervals and provisional coordinates and heights were calculated in the field. The road centreline dumpies were then coordinated and the compass-clino traverse connected and corrected to close between these points. This also served as a check on the radiations from control and raw closures of about 1:150 were usually obtained. A running level using the clino readings also helped isolate the odd taping or booking error. It was interesting to note that this form of traverse gave excellent results for sections of centreline running in a more or less linear sense whilst a similar length of meandering route attracted a much larger misclose.

In all, about 25 days were required for 25kms of field work with office reductions and plotting added to give a final job cost of approximately K1200 per kilometre, thus yielding a clearly viable approach to this form of rural land acquisition survey. In additions, two A1 size plans showing control traverse and locality details were lodged with National Mapping who have indicated that they will process reduced traverse information into coordinates within one week if given the field data in a suitable form.

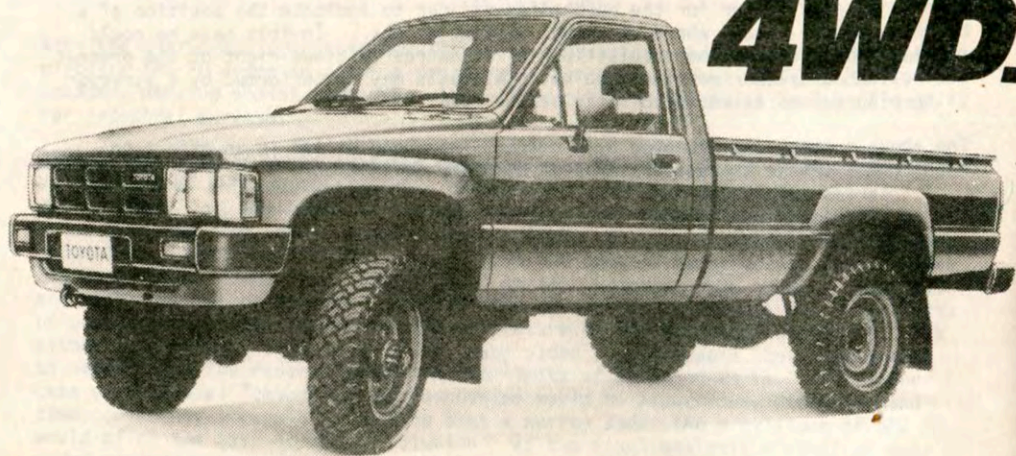
Some comments on SAC 20 itself are probably in order. As worded, it is obviously fairly flexible with the key to its successful operation being good permanent marking by the field surveyor and ready interpretability of plans by the end user. In this sense an additional alternative may be to present plans

with a dimensioned road traverse and a scaled reserve without boundary dimensions. A notation to the effect that the reserve boundary lies so many metres left or right of the existing track could then be added thus allowing a decrease in calculation and plotting of plans at a smaller scale. It should then be an easy matter for the purchasing officer to indicate the position of a boundary on the ground where no actual marking exists. In this case he could readily indicate that the acquisition is "20 metres left and right of the present centreline" and later more precise reinstatements may be performed by a surveyor using plan values as would normally be the case.

The above summary was prompted by a request from Doug Miller in an effort to highlight a little travelled avenue of boundary definition.

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EM1652

A MEMBER OF THE BURNS PHILP GROUP

The following short paper has been prepared by Bernard M. Narokobi LLB (Sydney).

Mr. Narokobi who is married with 7 children is from the East Sepik Province of Papua New Guinea and graduated in law from Sydney University in 1972.

He has been an acting Judge of the National Court of Justice and one of the Titles he holds is Honorary Professor of Philosophy (Melanesian - UPNG).

Mr. Narokobi has written several publications on Land & Socio-Economic matters as well as several plays all of which have been published.

He has his own Law firm with Headquarters in Port Moresby and is known as perhaps the foremost authority on Customary Land matters in Papua New Guinea.

LAND TENURE & LAND USE RIGHTS

Customary land in PNG makes up some 97 percent of the total land area. Most of this land is not used for commercial or export, cash earning agriculture. Instead it is used either for hunting, home construction, and gathering or for subsistence agriculture. Whilst for the most part, subsistence agriculture serve the needs of Papua New Guineans in the past, the needs and the demands of modern PNG are such that an increasing and a more varied use of customary land must now be made.

The emergence of cash cropping demands that the same land must be used more aggressively. Increasing population places even greater pressure on the land. Whilst general boundaries for example - "along the ridge," might be adequate for old use, modern use require more precise land boundaries.

The best way to understand land tenure in any village or community in PNG, is to understand clan, village or unit geneology and social structure. The legitimacy of customary land tenure is not dependent on any written statute, but directly on custom.

This means that whenever there is a dispute over any piece of land, the dispute is resolved, short of warfare, through extensive discussions and retelling of oral history and tradition. The party that can convince the court or a village mediator of the geneology, names, land use, migration, marriages, etc, will be conferred ownership.

Each village, has a number of clans or corporate groups. Generally then, land will be owned, in general by a village, e.g. PARI. Then within that village, there are smaller clans or "IDUHU". Individual clans will own parcels or traits of land as distinct from others. Each family and sometimes an individual within an "IDUHU" may also own particular parcels of land.

Membership in the clan or iduhu is either through the father or the mother. This membership largely determine land rights. These may be varied, as for example by a grant, a gift or by any other customary transaction. It is most important to note that STRANGERS cannot become individually or as corporate entities, own land, except through an established land owning unit. If membership of a clan is through the mother, land will, in principle be inherited through the mother, as in parts of New Ireland, Milne Bay, the Gazelle, and Buka. If membership is through the father, inheritance will be through the father, as in most of PNG. It is also possible to inherit through both parents.

Little or no work has ever been done to determine the methods or ways and means by which land at any given point in time falls to be determined or known as land belonging to or owned by a given land owning unit. Generally speaking land was acquired through warfare, conquest, hunting, gathering, fishing, settlement, use and exercise of domination to the exclusion of others. Subsequent to that original acquisition, transmission takes place within known ownership units, through marriage, gifts, sale, inheritance or extinction of prior and better rights.

No written law deals with customary land tenure. There are arguments for and against a statute giving recognition to land. Absence of legislation suggests there exist clearly defined criteria for determining customary owners and ownership. In practice and for most lands this would be so. But for some areas of land, where usage, descent, marriage and ownership are all intertwined, to determine who owns what is like trying to untie the gordian knot. More often than not, the very process of determining ownership leads to substantial and open warfare, often among the most peaceful of persons.

To this day, only the State may alienate land from customary owners. An automatic citizen wishing to buy land from another automatic citizen must go through the state. The reason was to prevent exploitation. However, more recent observations suggest, this is cumbersome and costly. It takes far too long.

As early as 1952, it was felt by the Administration that to speed up cash cropping, ownership recording would be necessary and so an effort was made to undertake that exercise. This effort failed first because the customary owners became suspicious and the exercise was beset with enormous conceptual and practical problems. It was simply too complex.

In 1960, a policy of Transformation was adopted, again with the aim to provide permanent security to meet loan requirements from the banks. Under this policy, the objective was to convert customary ownership into "fee simple" - or the highest land tenure in the English system. The objectives were to centralise administration of customary land and transformation from native custom to administration ownership, thus extinguishing native ownership and compensating natives for extinguishing native ownership.

By 1970, only about 600 conversions were made. The machinery to deal with this process was established under LAND TITLES COMMISSION ACT (No. 5 of 1962); Conversion took place under LAND (TENURE CONVERSION) ACT No. 15 of 1964. Registration was done under REAL PROPERTY ACT (1913) (Papua - basically English); and for NEW GUINEA (1924 as amended - again English in essence).

Problems encountered in the implementation of that programme were addressed to by a consultant, Mr. S. Routon Simpson. Several bills were prepared and introduced in the pre independence House of Assembly. The bills were withdrawn by Australian administration due to opposition by PNG politicians.

No formal decision exists to suggest that transformation policy has been abandoned. PNG's independence constitution is silent on land tenure only that in the 5th National Goal, it says clearly that development must take place primarily through the PNG ways or forms of social, economic and political organisations.

The Commission of Inquiry Into Land Matters report in effect made the same conclusion. LAND POLICY should be evolved from customary base and NOT from a sweeping agrarian revolution or total societal transformation.

By 1974, frustrations about making use of customary land for commercial purposes lead to a self governing House of Assembly enacting the LAND GROUPS ACT NO. 64 of 1974; and BUSINESS GROUPS INCORPORATION ACT No. 59 of 1974. These Acts were designed to incorporate recognised land groups, as legal, corporate entities; and to set up new machinery to resolve disputes via, mediators and Local and District Court Magistrates. Incorporation is based on common custom and recognition by others that the group is an entity.

Whilst the Business Group Act has been used extensively to incorporate business activities with flexibility and simplicity, the Land Groups Act has not been used much. My guess is that the Land Group Act does not enable the basic land owning units - individual or a family which are the basic units of production to be registered because they are far too small.

The upshot is that there is considerable confusion. The Land Disputes Settlement Act Ch. No.45 was passed in 1974 to settle disputes arising from among the people. Under this Act, appearance of Lawyers is excluded. If mediation failed, disputes would be settled by Local Land Court Magistrates. Right of appeal exists to District Land Courts. No appeal lies to the National or the Supreme Courts. However, the superior courts may review decisions and suggest new hearings under the Constitution of PNG.

There is a strong body of statute law which is based on the fourth Constitutional Goal of PNG. Conservation and Replenishment of the Environment. The notion is that present generations hold natural resources, including land and environment in sacred trust for succeeding generations. This body of law insist on environment, flora and fauna conservation. See for example - FAUNA (Protection and Control) Act Ch. No. 154; Conservation Areas Act No.52 of 1978; Environmental Contaminants Act 1978; and Environmental Planning Act.

The Water Resources Act by a stroke of a pen vests all ownership of waters in PNG in the State, while the Forestry Act (Ch.216) vests timber rights in the state, giving use rights only to customary owners, for traditional purposes. On the other hand, the Fisheries Act specifically recognises the traditional fishing rights over the sea and the reef and the low water mark.

All minerals are owned by the state and traditional land owners are accorded rights over the top soil which is compensatable and over which royalties are paid.

By virtue of the first Amendment to the National Constitution and the Organic Law on Provincial Government, it is imperative that even in areas where the national government has exclusive powers, as in land, and in mining, and water and timber, consultation with provincial governments is necessary. If no consultation takes place, provincial governments can, as they have, frustrated national policies and plans.

In the area of land, delegation of powers of the national government to provincial government is possible. In recent times,

at least one provincial government (East New Britain) was granted land powers - these are restricted to alienated or state land. Customary land is very much a matter of custom and even provincial or local governments have no power over the customary owners or ownership.

Accepting Seidmans models as the starting point, we see that there are 3 models that a legal regime or framework might adopt

- (i) status - based on subsistence
- (ii) capitalist - based on contract
- (iii) plan - more or less social with state control. I might add a fourth one
- (iv) a mixture of one or more of these - mixed model.

Pabwala suggests that the transformation approach is inspired by a "western diffusionist model which sees traditional modes of production and models as an anathema to a capitalist economy. Communal ownership prohibits capital manipulation, so would this theory suggest. In practice, even the modern concept of a company is a collective ownership.

Modern and contemporary trends in land use in PNG suggest that there is a steady transformation of land tenure and land use. The increasing number of land dispute cases our firm handles from all over PNG suggest that a definite change is taking place. Traditional systems are becoming disrupted in some places, while in others, they are being strengthened. The main forces of change appear not to be legislations, but technology, new skills and new crops and trees and animals - new use.

It is true that land disputes are inhibiting rapid land use. But, on the other hand, use will be made when the pressure to use is great, so there are inherent mechanisms for change.

Banks lending policies play a significant role in shaping land policies. Accordingly lending policies and the factors determining principles for lending will need to be considered.

This inevitably suggest, even a cursory view of the type of economy PNG has adopted and is likely to promote in the foreseeable future, for more often than not, the type of economy and political system or ideology will ultimately shape legal and administrative mechanisms to land tenure.

Present indications suggest there is likely to be a commitment to TRADITION or PNG WAYS or MELANESIAN WAYS however, defined these notions might be. In the light of this assumption, careful examination will need to be made of the basic legislation on Land - the Land Act; and others already mentioned.

If we accept as a model a Development Economy - based on "redistribution and growth" and liberal democracy with a parliamentary system and a strong bureaucracy and decentralisation, then we see two inevitable working premises:-

- (1) state control
- (2) Customary Controls - with government Ministries working in between to reconcile the two or to resolve are in favour of another. Extreme collectionist and extreme

individualist approaches will be controlled in this interplay.

New legislation may have to be recommended along with new policies to make more customary land available for a more diverse and commercially productive use of the land.

At the same time, it is crucial that radical charges are not made, as no matter how good they are, they will be most useful if they emerge from experience of the people.

There is an urgent need to reappraise the trend of development and lay foundations for those who are able and willing to make use of the legal and administrative foundations to make the necessary adjustments, if they are needed from a traditionally rooted society to a contemporary society.

.....*B. M. Narokobi*.....
B. M. Narokobi

(11.9.86)

1987 PACIFIC REGIONAL CONGRESS

PORT MORESBY PAPUA NEW GUINEA



Commonwealth Association of
Surveying and Land Economy

CASLE - ASPNG CONGRESS

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4 - 7 AUGUST 1987

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In the first instance Members are invited to submit a single page summary of their intended paper to :

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In conjunction with
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Congress Secretary
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P.N.G.

DATUM TRANSFORMATIONS WITH SPECIAL REFERENCE

TO PAPUA NEW GUINEA

P. Done*

M.A. M.Sc. C.Eng. F.I.Nuc. E. A.R.I.C.S. M.I.S. (Aust).

* Department of Surveying and Land Studies
PNG University of Technology
Private Mail Bag
LAE
Papua New Guinea.

DATUM TRANSFORMATIONS

1. INTRODUCTION: COORDINATE SYSTEMS
2. THE GEOID PROBLEM
3. THE IDEAL TRANSFORMATION
4. THE TYPICAL LOCAL SITUATION
5. DOPPLER TECHNIQUES
6. SOME OPERATIONS USED IN PAPUA NEW GUINEA
7. BIBLIOGRAPHY

1. Introduction

Since the introduction of geodetic satellite positioning, and especially in PNG, the subject of datums has given rise to some difficulties both terms both of concept and application. However, a datum in this context is no more than a coordinate reference system. The geodetic coordinates of latitude, longitude and height are measured with respect to a reference ellipsoid. This geodetic coordinate system and the associated cartesian coordinate system are illustrated in Figure 1. The size, shape, orientation and origin position of this ellipsoid define the coordinate reference system and are usually chosen so that the surface of the ellipsoid corresponds closely with the geoid in the area the datum is designed to cover. The basic reason for this choice is that when the surveyor takes observations, his instrument is measured with a spirit bubble which automatically references the observations to the level surface of the geoid. For geodetic purposes observations should be reduced to the reference ellipsoid before positions can be calculated. Only if the separation between the geoid and the ellipsoid is small will there be little effective difference between reductions to the geoid and reductions to the ellipsoid.

2. The Geoid Problem

The geoid varies irregularly world-wide. This variation in the geoid is sufficient to afford a choice of different datums (size, shape, origin position and orientation of the ellipsoid) to achieve a good fit for different regions of the earth's surface. This is shown in an exaggerated sense in Figure 2 where the North American datum is extrapolated to Europe. Even though the datum fits the geoid in the North American continent well, it does not fit the geoid in Europe. Conversely if the European datum were extrapolated to the North American continent, the same result would be found. Before satellite Doppler positioning, nearly all surveys were carried out using stations coordinated by previous surveys as starting points, and were therefore automatically referenced to the same datum as those previous surveys. Datums, like conventional surveys, formerly seldom crossed oceans or national boundaries and it was rarely necessary to transform the results of a contentional survey from one datum to another. But with satellite Doppler available on a world-wide basis and having sufficient accuracy for applications in surveying and geodesy, it became necessary for datums associated with the satellite Doppler positioning system to be global in nature rather than regional.

There are two satellite datums in common use. The most widely used is the "broadcast ephemeris datum". As the name implies this datum is defined by the operational ephemeris broadcast by each of the TRANSIT satellites. Hence, real-time position computations performed by an instrument such as the MX1502, now available in PNG (and used very successfully in control surveys in the Ok Tedi and Fly River regions and for border surveys) will yield positions on the broadcast ephemeris datum.

The other satellite datum in use is the "precise ephemeris datum". This datum is based on satellite orbital information calculated by the Naval Surface Weapons Centre using tracking data from the TRANET network. In contrast to broadcast ephemeris information which is available immediately for all of the TRANSIT satellites, precise ephemeris orbital information is not obtainable until several weeks after the survey is conducted, and is only available for limited number of satellites (usually two).

Furthermore, it is usually not made available to commercial users of the TRANSIT system. Certain military and Government users are allowed access to precise ephemerides provided that the US authorities approve (e.g. in PNG the Royal Australian Survey Corps (RASC) which carried out over 200 point positioning Doppler measurements did have access to these codes), but in any case it is not strictly necessary for geodetic accuracy. The full potential of the Doppler system appears best realised by use of the translocation technique, which effectively obviates many common errors and can now give results (virtually) in real-time. The BHP operations in the Fly River region employed broadcast ephemeris and translocation.

3. The Ideal Transformation

The ideal transformation from one datum to another needs to take into account all possible differences between the two datums. The possible differences are:

1. A difference in the position of the two origins. This difference is best expressed by three orthogonal shifts (dX , dY , dZ).
2. A difference in the orientation of the two ellipsoids. This difference is best expressed by rotations about the three coordinate axes (RX , RY , RZ).
3. A difference in linear scale between the two systems. This is usually expressed as a difference in parts per million (Δ).

Hence the ideal transformation is one using a total of seven parameters, dX , dY , dZ , RX , RY , RZ , Δ .

One way of obtaining these seven parameters is to solve for them in a simultaneous least squares adjustment involving a large

number of well distributed points with positions determined by both satellite Doppler and conventional terrestrial techniques. The mathematical model used in the adjustment to relate the terrestrial positions, the satellite positions and the transformation parameters is called the Bursa-Wolf model. In matrix format this has the following form:-

$$\begin{bmatrix} X1 \\ Y1 \\ Z1 \end{bmatrix} = \begin{bmatrix} dX \\ dY \\ dZ \end{bmatrix} + (1 + \Delta) * \begin{bmatrix} 1 & -RZ & RY \\ RZ & 1 & -RX \\ -RY & RX & 1 \end{bmatrix} * \begin{bmatrix} X2 \\ Y2 \\ Z2 \end{bmatrix}$$

where (X1, Y1, Z1) and (X2, Y2, Z2) are the coordinates of a point in the local datum and satellite datum respectively.

The data required for such an adjustment are usually only available to a national survey or mapping department and the derivation of the seven parameter set is usually best carried out by such a department. Once the seven parameters have been determined, they may be keyed into an MX 1502 which uses the Bursa-Wolf model to transform between satellite and local datum coordinates.

4. The Typical Local Situation

Unfortunately the seven transformation parameters are only available for a very limited number of local datums and where they are not available the surveyor is forced to use alternatives.

Consider the situation where the only information known about the local datum is the size and shape of the ellipsoid. One possible procedure is to set up an MX 1502 with known coordinates in the local datum and to derive a three-parameter (DX, DY, DZ) transformation by comparison of the satellite datum point positioning results with the known local datum coordinates. (Such a three parameter transformation amounts to algebraic addition of DX, DY, DZ to transform between the coordinate systems). The station used could be the control station for a translocation survey, or multi-point network, in which case there is no extra effort involved. The only problem that arises is that precise values for the geoidal height relative to the local datum are usually not available.

This is all too often the case in PNG where no first order national height network exists. The local datum information is usually latitude, longitude and elevation above mean sea level while the satellite datum information is usually latitude, longitude and ellipsoidal height. The three parameter transformation (DX, DY, DZ) is calculated as a difference between the (X, Y, Z) coordinates of the point in the two datums. The (X, Y, Z) coordinates are obtained from latitude, longitude and

ellipsoidal height but the ellipsoidal height in local datum cannot be obtained until the geoidal height relative to the local datum is known. This geoidal height is in turn dependent on the transformation parameters and hence a value of one must be assumed before the other can be calculated.

There are two possible alternative approaches to obtaining an estimate of the local datum geoidal height, so as to allow calculation of the three transformation parameters.

- It could be assumed that the local datum geoidal height is the same as the satellite datum geoidal height (see Figure 3). This is in effect assuming that the local datum ellipsoid is coincident with the satellite datum ellipsoid at the point of comparison.
- It could be assumed that the local datum ellipsoidal height of the point is the same as the elevation above mean sea level (see Figure 4). This is in effect assuming that the local datum ellipsoid is coincident with geoid at the point of comparison.

The assumption (b) appears more valid in that local datums are by definition designed to fit the geoid well. The transformation obtained using this assumption should therefore be more valid than that obtained using the first assumption.

The effect of either of these assumptions is not serious if the transformation is only used to transform coordinates of points close to the point at which the transformation was derived. If the transformation is used over too large a distance these two assumptions will cause errors in the derived local coordinates. The maximum distance at which the transformation remains usable will depend on the magnitudes of the neglected rotations and scale bias (RX, RY, RZ, Δ) as well as on the accuracy that is desired.

5. Doppler Techniques

Satellite Doppler positioning surveys fall into two basic classes; those which yield an absolute or point positioning and those which yield a position relative to a known point (translocation). The accuracy of datum transformations is crucial to the accuracy of point positioning results since an error in the transformation parameters affects the point position directly. However, translocation results are not so sensitive to the accuracy of the transformation parameters. In fact with the MX 1502, the translocation program is designed so that it is only necessary to enter the semi-major axis and flattening of the local ellipsoid if the height of the control station above this ellipsoid is known.

In this case, a three parameter transformation is calculated and implemented using the post-translocation command. If only the elevation of the control station is known, then transformation parameters must be entered but substantial changes in the value of these parameters will only have a small effect on the coordinates of the translocated station.

Hence, while datum transformations are a major consideration with point positioning, they are of little importance in relative positioning using translocation or network techniques. Such relative positioning is increasingly becoming accepted as the standard Doppler positioning survey technique because of its relative immunity to datum transformation problems as well as its superior accuracy and convenience.

6. Some Operations Used in PNG

- (a) The first body to carry out extensive Doppler work in PNG was the RASC, during the period 1974 to 1979, using the AN/PRR Geociever, the "state of the art" at that time. They used the point positioning mode and the coordinates were computed later using precise ephemerides.

Ground surveys in PNG are connected to the AGD-66 by the US HIRAN network. Consequently, AGD-66 co-ordinates in PNG may vary from their absolute value by up to ten metres, while relative accuracies within the country are of higher order.

The ANS intersects the geoid, or mean sea level surface, in PNG. The spheroid/geoid separation is up to 20 metres; reductions of distances to mean sea level are reductions to the ANS within an accuracy of about 3 parts per million. Some off-shore areas of PNG are not adequately connected to the AGD-66, and the WORLD GEODETIC SYSTEM - 1972 (WGS-72) spheroid and datum was agreed for these areas. 151 stations are in the AGD-66 area and 51 in the WGS-72 area.

Using the differences between NAVSAT derived WGS-72 coordinates and known AGD-66 coordinates at 22 stations, WGS-72 coordinates for 129 stations in the AGD-66 area were graphically transformed to AGD-66; changes varied from 4".43 to 5".43 southwards and 2".93 to 3".73 westwards. Likewise, using the differences between NAVSAT derived heights about the WGS-72 spheroid and known heights above mean sea level at 109 stations throughout PNG, WGS-72 heights were graphically transformed to MSL heights; changes varied from -60 to -85 metres.

Doppler satellite positioning systems provide co-ordinates based on an earth-centred datum. Using observations by AN/PRR-14 Geociever to the US NAVSAT satellite system, the derived co-ordinates are based on the Naval Weapons Laboratory 9D (NWL-9D or NSWC-9Z-2) spheroid. These NWL-9D values can then be mathematically transformed to the geodetic datum in use.

Transformation was made to the World Geodetic System - 72 (WGS-72) spheroid, and its earth-centred origin of co-ordinates for 51 Geociever fixations in the areas concerned.

The selection of WGS-72 spheroid and datum was by mutual agreement between Australia and PNG.

The transformation from NWL-9D to WGS-72 was carried out using the standard Molodensky Formula as shown by Seppelin in reference 7. A simplified summary of the procedure is shown below.

Formulae:	Parameters:	Instructions:
$\Delta\phi'' = \Delta f \sin 2\phi / \sin 1''$	$\Delta r = -5.27$ metres	To obtain WGS-72 co-ordinates
$\Delta\lambda'' = 0''.260$	$\Delta a = -10.0$ metres	add the $\Delta\phi$, $\Delta\lambda$, ΔH corrections
$\Delta H = \Delta f \sin^2 \phi - \Delta a + \Delta r$	$\Delta f = -0.112415 \times 10^{-6}$	to the NWL-9D co-ordinates
		(ϕ , λ and H). Latitude is
		positive North. Longitude is
		positive East.

The parameters of WGS-72 are given in Reference 7 and are summarized below.

Semimajor axis	$a = 6378135 \pm 5$ metres
Flattening	$f = 1/298.26 \pm 0.6 \times 10^{-7}$
Gravitational constant	$GM = 398600.5 \text{ km}^3/\text{sec}^2 \pm 0.4$
Angular Velocity	$w = 0.7292115147 \times 10^{-4} \text{ rad/sec} \pm 0.1 \times 10^{-13}$

Correlation between heights above the geoid (mean sea level), h , and heights above the WGS-72 spheroid, H , are expressed as N , where $N = H - h$. N ranges between +60 metres to +85 metres in Papua New Guinea; the WGS-72 spheroid is an average of 74.7 metres below the geoid, or mean sea level surface. (The Army added a codicil to its "hand-over" notes in 1981 to the effect that, if the Government of PNG were to consider that a change to a single geodetic datum would be in the national interest, Australia would recommend the adoption of WGS-72. They estimated that current AGD-66 co-ordinates would change by an average of 187 metres, along a bearing of approximately 035 degrees).

- (b) The B.H.P. operation which involved control in areas connected with the Ok Tedi scheme used translocation, using as datum the RASC station at Daru which is also HIRAN 24.

(c) At the time of writing (February 1984) it is understood that the border between PNG and Irian Jaya is being surveyed by translocation techniques but no details are available to the writer.

Acknowledgement

Dr. G.J. Hoar's published work on Satellite Surveying (e.g. reference 4) have been drawn on extensively for the theoretical parts (sections 3 and 4) of this article.

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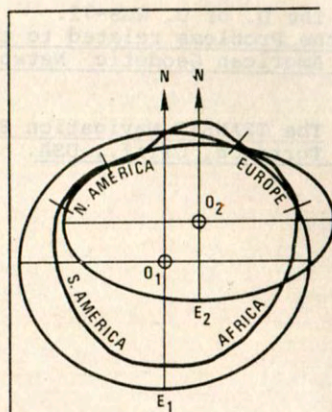
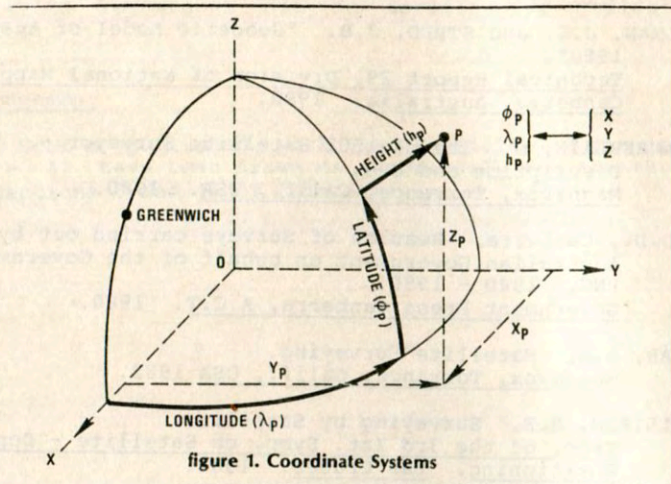
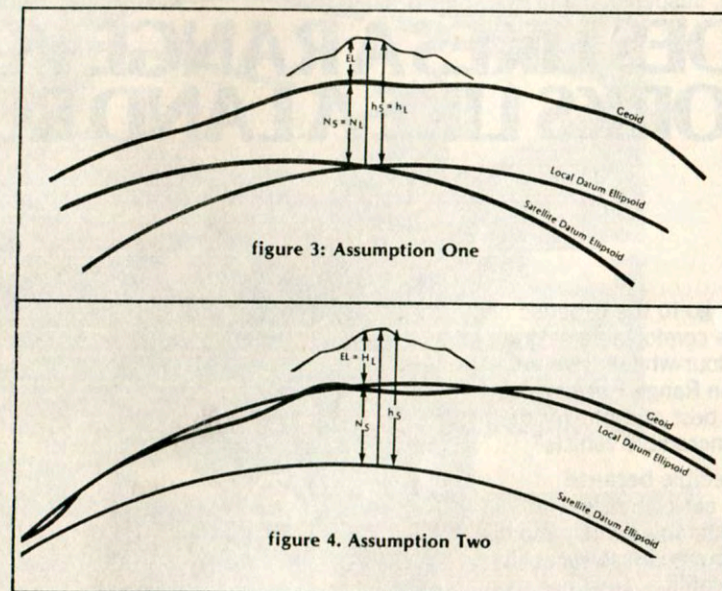


figure 2.
The Geoid and Two Spheroids



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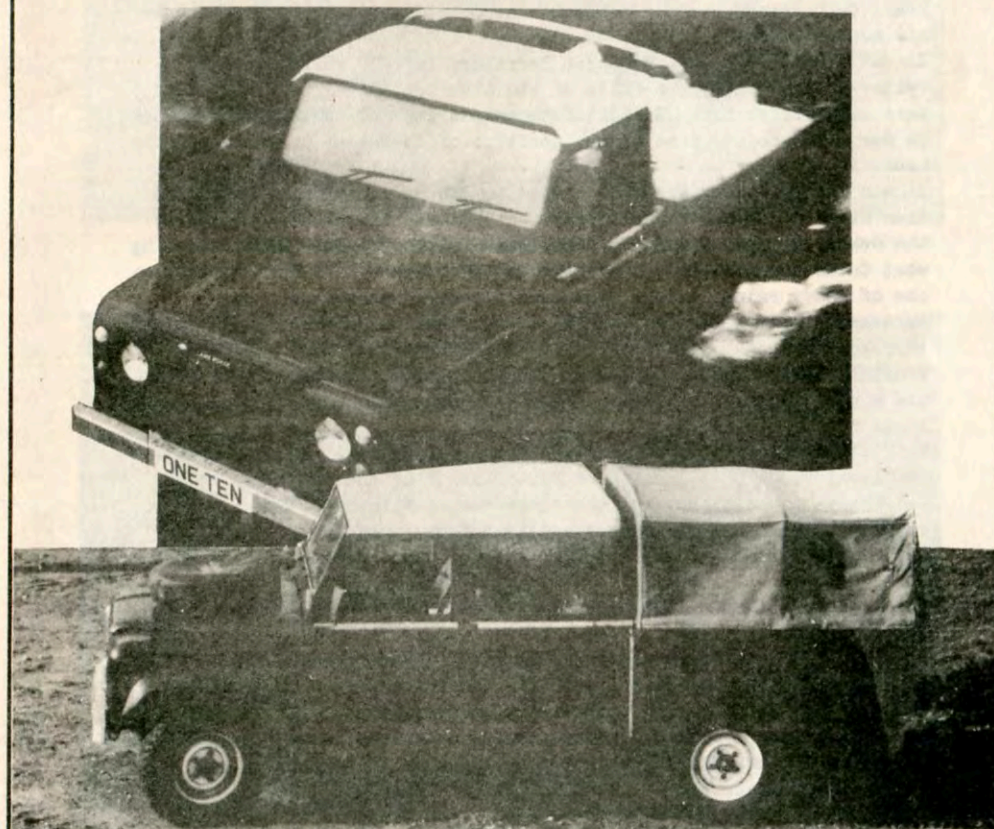
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WALTER CUTHBERTSON

The pioneering surveyor and explorer of Port Moresby and the SE Highlands of Papua, Walter Cuthbertson, is to be commemorated by the Association of Surveyors of Papua New Guinea on the 11 August 1986. In about 1950 Mr Len Smith, jeweller, erected a plaque bearing Cuthbertson's name and a motif of a theodolite on the wall of his shop across the street from the Post Office. The Association has set the restored plaque and motif on the new multistorey building on the site to acknowledge the work and dedication that this Australian surveyor achieved for the progress of PNG.

Believed to be born one of three sons in Darlington, England, Cuthbertson went to Australia as a small boy around 1853. In 1876 he began work in the Survey Office in Adelaide at a salary of £100 per year. Cuthbertson quickly achieved the position of head chainman only six months later.

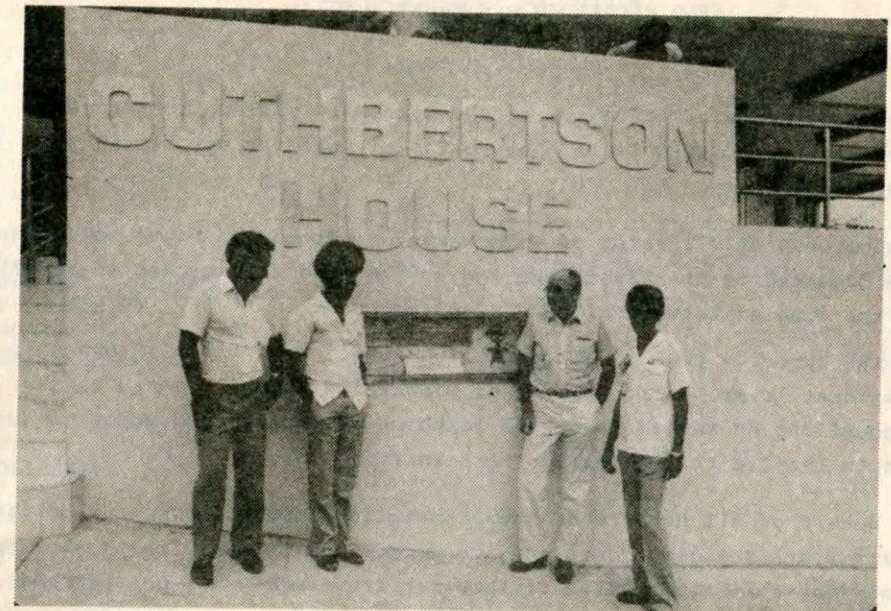
He was appointed to the Northern Territory in 1878 where, it is believed the Cuthbertson Falls on the Liverpool River in Arnhem Land were named after him. In 1881 Cuthbertson carried out land title work in North Borneo and rose to the position of Assistant Commissioner of Lands in 1883.

It was in 1886 that Cuthbertson came to PNG under the service of the then Queen's Special Commissioner for 'British New Guinea' to survey the newly acquired land in Port Moresby. Although somewhat hindered by what Cuthbertson called "the stifling atmosphere" of Port Moresby - one of heavy rains, little winds and plentiful mosquitoes, he successfully surveyed the townships of Granville East and West: today Port Moresby town and Konedobu. He also surveyed public, native and mission reserves and a cemetery near what is now Badihagwa High School and a preliminary road survey from Ela beach through the "Gap" at three mile hill and out to the Laloki River.

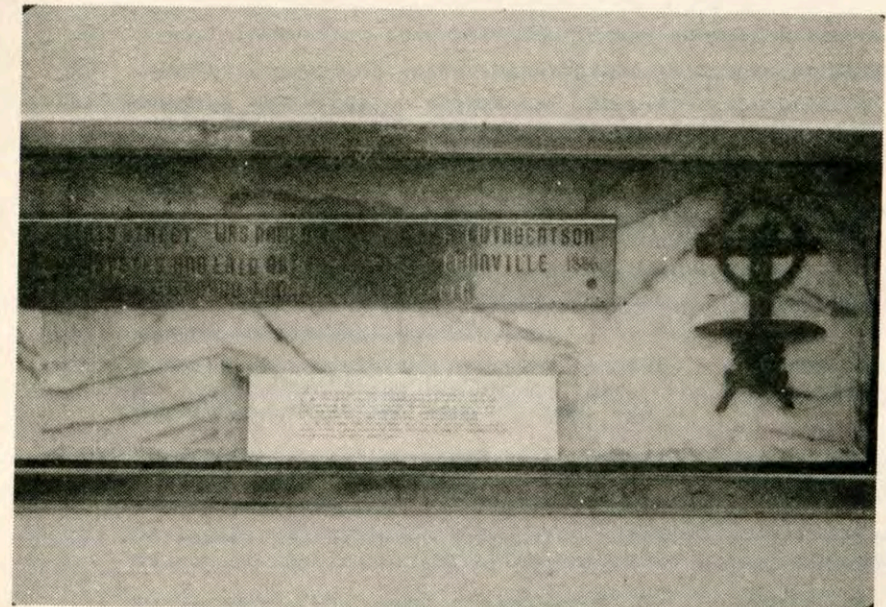
Yet Cuthbertson's work did not end there; In 1887 he was sponsored by the Royal Geographic Society of Victoria and on the 20th July led a scientific expedition into the south-east highlands of Papua. He chartered Mr Goldie's cutter the "Ada" from Port Moresby to Kapa Kapa, near Rigo and then set out for Mount Obree accompanied by Mr G Hunter (the Govt. agent who had lived in the area for three years) a Naturalist collector, W.A. Sayer, a selection of native carriers and seven horses.

Despite the "incessant downpour of rain" Cuthbertson's team traversed the 90 km. to the foothills and ascended to near the summit by the 28 August. At this point the accompanying natives, terrified by superstitions, fled the mountain with all their belongings. The next day Cuthbertson and Sayer ascended to the summit and in doing so reached the divide and a height greater than any previous expedition. Cuthbertson also managed to bring together, without hostility, as many as twenty different tribes into one camp.

Above all, Cuthbertson successfully completed the first surveys in Papua and his expedition paved the way for subsequent development of the region.



Messrs. Salaiau, Posanau, Larmer & Ranu outside Cuthbertson House.



The Walter R. Cuthbertson Plaque.

WILD HEERBRUGG PNG TRUST FUND

The Association of Surveyors of PNG wishes to express its sincere appreciation to Wild Leitz (Australia) Pty Ltd for establishing the Wild Heerbrugg PNG Trust Fund.

Two percent of all sales of Wild survey equipment in Papua New Guinea are credited to the Trust Fund and so the Fund is expected to benefit to the tune of between K1500 - K2000 per year.

On the opposite page is a letter from Association of Surveyors President to Mr. Wally Wardrop of Wild in which Mr. Posanau makes suggestions on the various uses to which the Trust Fund money can be put to benefit the Profesion here in PNG.

On behalf of all Members of the Association I compliment Wild Leitz Australia's Managing Director Nick Weibel and fellow Director Graeme Arman for their initiative in this matter and they may be assured the Trust Fund money will be used wisely.

EDITOR

Association of Surveyors
of
Papua New Guinea

29 August, 1986

Mr. W.I. Wardrop,
P.O. Box 19,
Spring Hill, 4000
BRISBANE, QLD

Dear Sir,

RE: WILD HEERBRUGG PNG TRUST FUND

I refer to your letter referenced WIW:ch dated 25th November 1985 regarding the documentation and operation of the above Trust Fund.

My Council discussed the points raised your letter and have agreed to the following being some of the areas or things the fund could be used for :-

- i) Assist in funding surveyors continuing education courses.
- ii) Funding of some of surveying students textbooks at UNITECH.
- iii) Funding of awards or prizes for the best cadet project submitted to the PNG Surveyors Board - Excellence award.
- iv) Assist in funding national surveyors at overseas and ASPNG Congresses.
- v) Funding of publicity pamphlets or campaign to promote surveyors role in the development of our communities.
- vi) Funding of special studies by national surveyors in relevant areas to benefit the surveying profession and the country.
- vii) Assist in funding Journals and
- viii) Funding other relevant areas or projects the Council sees go towards promoting the objectives of the Association of Surveyors of PNG and some of these are :
 - a) To promote the science and practice of surveying in all its branches, and the usefulness and efficiency of persons engaged therein.
 - b) To raise the character and status and advance the interests of the profession of surveying and those engaged therein.
 - c) To encourage the study of surveying and to improve and elevate the general and technical knowledge of persons engaged or intending to engaged in the profession of surveying.

- d) To promote and safeguard the interests of the profession of surveying generally.
- e) To do all such things as the Association may think incidental or conducive to the attainment of the above objects or any of them.

We concur with your suggestion on the method of withdrawal of money from the funds and as stated in your letter we are looking forward to a statement from you on the level of the funds now available.

Many thanks.

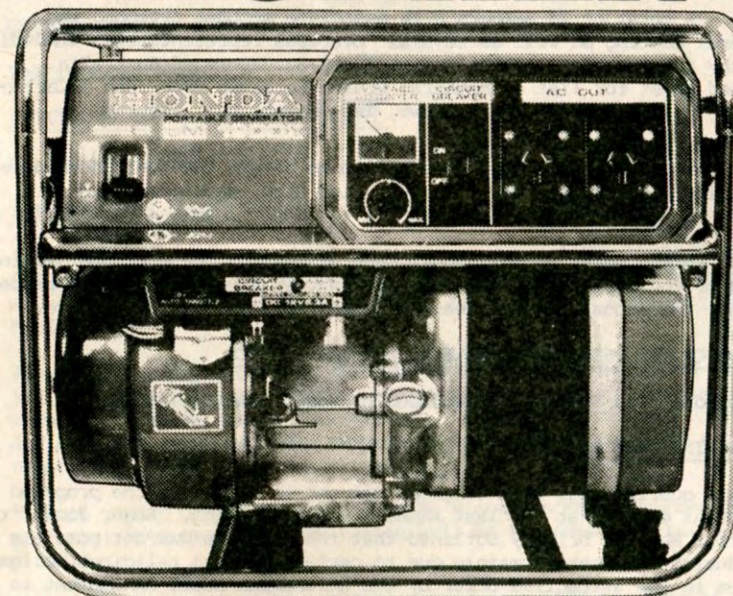
Yours faithfully,
ASSOCIATION OF SURVEYORS OF PNG.

Francis P. Posanau
PRESIDENT

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MINUTES OF THE 27TH ANNUAL GENERAL MEETING HELD IN LAE ON THE

1ST JULY 1986

1. ATTENDANCE AND APOLOGIES

Attendance: A total of 23 members & 16 associate members attended the Annual General Meeting as well as several overseas representatives including David Lorsch, the President of the Institute of Surveyors of Australia. (See attached sheet for list of members) Proxys received from John McCartney, Clive Carson, Bill McKibben, Ian Billows, Ted Nacino, Gali Taturan & Bill Harvey.

Apologies: The following members were unable to attend the AGM and tendered their apologies: Gairo Wai, Garry Crosse, Dick Lieu, Mark Zorro and Ted Vur.

Prior to the commencement of the Annual General Meeting the President reminded the members of the death of Alan Bale approximately a year ago and in respect of our member the Annual General Meeting paused for a minute of silence.

2. CONFIRMATION OF THE 26TH ANNUAL GENERAL MEETING MINUTES

This was moved by Ian Sparks and seconded by Roger James. carried

3. BUSINESS ARISING FROM MINUTES

Clive Bassett queried that this Congress was not in line with the proposed Congress format decided at the last Annual General Meeting. Roger James, this years Congress Manager briefly outlined that the Congress was not possible to be staged during the weekend mainly due to certain members religious obligations chiefly, due to the attractive offer by the Melanesian Hotel Management to stage all the functions at a relatively cheap price, the Congress Committee had no option but to accept their offer. This was approved by the Council.

4 & 5. REPORT OF THE COUNCIL

With regards to the proposed alternative Survey Marks, Clive Bassett, Zeriki Duambo and Mike Larmer spoke in favour of the proposal while John Pengul and Michael Sirabis were not so convinced particularly of the transportation cost. The general attitude was that it is an alternative survey mark just like the Iron pipes and hence should be adopted.

The Treasurers report was tabled and accepted in its present format.

Fred Pratt moved the Council report be accepted, seconded by Norm Leet.
Motion Carried.

6. PRESENTATION OF CERTIFICATES

This year the task of Printing the Certificate was with Norm Leet however, because of work commitments the Certificates were not printed in time. Kevin McConell agreed to print the last years Certificates and will be responsible for future printing.

7. PRESIDENTIAL ADDRESS

See attached sheet.

8. COUNCILLORS FOR 1986/87

See attached sheet.

9. ADDRESS BY THE INCOMING PRESIDENT

See attached sheet.

10. 1987 CONGRESS DATE & VENUE

It is confirmed that the 1987 Congress was to be held in conjunction with CASLE and is to be held in Port Moresby. The date is yet to be fixed but it will be held on the 1st week of August commencing on a Tuesday and ending Friday.

The theme Urban Squatter Settlement and Environment Design as suggested at the 26th Annual General Meeting was raised, however it was also suggested that a second theme be gauged from members. A paper was circulated but nothing definite was accepted. The members to notify the Council of any thoughts of a theme.

Michael Larmer officially agreed to be a one man Congress Committee but invites any input from members. Invitation will be extended to other allied professionals.

Norman Leet moved that the tentative venue for 1988 congress be Madang - seconded Roger James.

Motion carried.

All materials to be prepared at Unitech - Lae.

11. GENERAL MEETING

11.1 Ian Sparks explained the purpose of the Outhbertson Plaque to members. The Plaque, which depicts Surveyor Outhbertson who is known to be the first Surveyor to survey the down town Port Moresby was supposed to be officially unveiled by one of Outhbertson descendants. However, all efforts to trace one of Outhbertsons descendants in time were fruitless so it will be now be unveiled by the Governor General Sir Kingsford Dibela in August.

- 11.2 Doug Miller wants details of each member to be published in the Newsletter, Kevin McConell suggested a brief resume of members be prepared by individuals and sent directly to Council.
- 11.3 Ian Sparks asked for copies of the Association Code of Ethics and Norm Leet replied that he has plenty in his office, which he can circulate to Members who require them.
- 11.4 Norm Leet spoke about the legality of ASPNG; He said it is covered under the Survey Act.
Mr. Sparks to follow up: the legal status of ASPNG again.
- 11.5 Michael Larmer suggested that there should be more Council Meetings a year than the 2 or 3 meetings in the 1985/86. The President said that there were more than two Council Meetings in the 1985/86.
- 11.6 Geoff Patterson suggested that the Secretary writes to all eligible Associate Members to upgrade their membership.
- 11.7 Doug Miller said names of Councillors should be sent to the editor of the newsletter for members to be aware of the existence of the Council.

Past Journals have been stored in achieve at Unitech. Clive Bassett congratulated Doug Miller on the hard work done by him in getting the newsletter published.
- 11.8 Mr. Lorsch (ISA) expressed greetings from the Surveyors of Australia and said his short stay has been very enjoyable. He pointed out that problems faced here are no different to theirs. He went further to extend an invitation to members of ASPNG for the ISA Congress in Perth next year.
- 11.9 Roger James said that there would be some surplus funds from the Congress and asked what would be the best way to use them.

After some discussion on buying a computer for the Secretary and lowering fees for certain functions it was resolved that the residue put to next year's congress: moved by R. James seconded Ian Sparks, motion carried.
- 11.10 Ian Sparks moved that the incoming Council should investigate the possibility of purchasing a computer for the secretary, seconded by Pomaleu Salaiau.
Motion carried.
- 12.1 BY-LAW AMMENDMENTS

Pomaleu Salaiau said that the past sub-committee did not succeed due to lack of feed back from members. Norm Leet said the only comment received was re the eligibility of Members.

It was moved by Mr. Sparks that Mr. Doug Miller be the one man committee for the By-Law Amendment - Second Livingstone Tabua.

Motion carried on the voices.

There being no further business the Meeting closed at 11.55.

Albert M. Alois
Hon. Secretary,
ASPNG.

ATTENDANCE ANNUAL GENERAL MEETING OF

ASPNG 1986

	MEMBERS	ASSOCIATES	VISITORS
1	R T JAMES	R MAIPU	P R KOBAL
2	N LEET	S MADU	T KAMBIU
3	J SIPUMAN	A SUI	BILL TAIAN
4	F POSANAU	J ILAI	LUTHER SIPISON
5	K MCCONELL	Z SOMBO	A YARU
6	L TABUA	A GALGA	LANE T UFE
7	W WALLEY	H OAPE	DAVID LORSCHY (ISA)
8	M POPEU	H TAI	
9	KILA O RANU	J PENGUL	
10	Z DUAMBO	J A ROBERTSON	
11	N MATUI	G A KASEN	
12	A C BASSETT	V VALLALA	
13	G R PATTERSON	W EREMU	
14	F C PRATT	D CRUICKSHANK	
15	M J LARMER	G KIAP	
16	I R SPARKS	K G SEGEYARO	
17	MICHAEL SIRABIS		
18	PRAW HINAVE		
19	A DOUG MILLER		
20	CLIVE CARSON		
22	POMALEU SALAIAU		
23	ADELBERT ALOIS		

Note: Certain poetic licence has been taken with the original of these minutes.



Institution Surveyors Australia President David Lorsch addressing Annual Dinner.



Carson, Miller & Co. prepare to supp.



Ian Sparks, Bill Harvey & friends.



Fred Pratt gets the Joke Adelbert Alois & Tony Luben not so sure.



John Pengul heads up a good team.



President Francis Posanau has blinded Clive Carson with Science but Clive Bassett understands all.



For once Norm Leet is not missing his S.P. Must be all the Wine on the table & Barry Milliken does not touch the staff.



Morobe Theatre Group provided marvelous entertainment at Farewell Barbeque.



Morobe Dancers in full swing.



Pomaleu Salaiu & Commonwealth S.G. John Sleep saying 'CHEESE'.

I thought this years Survey Congress in Lae was a successful one. For a change we had only a three day Congress which was decided at the Rabual Congress last year. Despite this, we probably achieved or said a lot of things which the Council will follow up in the coming year.

I thought the idea of having a Forum was a good one. At least members were given the opportunity to express their thoughts. Opinions and Criticisms expressed in a open Forum are signs of maturity and good democracy at work. We should continue with this open Forum in future Congresses, I feel.

The farewell party was very well organised. The surrounding at Melo Hotel Pool as well as the Lae Theatre group created a very impressive night for all of us. We were also fortunate to have the Lord Mayor of Lae, Mr. Royden Aigel and the Provincial Minister, Mr. Boin Mirera to officially close the Congress.

I would like to thank the Chairman of the Congress Committee, Mr. Roger James and his Committee members for a job well done. Special thanks must also go to the authors of papers. The Congress programs were centred around these papers which were of high standard. I would also like to thank everyone for attending this years Congress. In particular, I would like to thank the Commonwealth Surveyor General, Mr. John Sleep and the President of the Australian Institute, Mr. David Lorsch and Mrs. Lorsch.

Carolyn and David were invited to a "Melanesian" evening at Goroka by our Goroka members and at Mt. Hagen by our Hagen members when they were on familiarisation tour of the Highlands Region Straight after the Congress. We presented one or two things to them to take home. Our members were very grateful to them to spend the time with us discussing surveying matters in Australia and here. I can assure you all, these were memorable evenings.

Stirrers paddle has been found. Jerry Sipuman at last found it among some old junk at the back of an old store. It is now in my possession in Goroka ready to be used in 1987 - any bids please.

Finally don't forget the 1987 joint ASPNG and CASLE Congress. We need your support and attendance. I am sure we will have overseas delegates as well as members from other allied professions here such as Valuers, Quantity Surveyors, and Land Administrators.

We'll see you all in Moresby on the first week of August 1987.

Best wishes to all of you.

FRANCIS P. POSANAU
PRESIDENT

AMP

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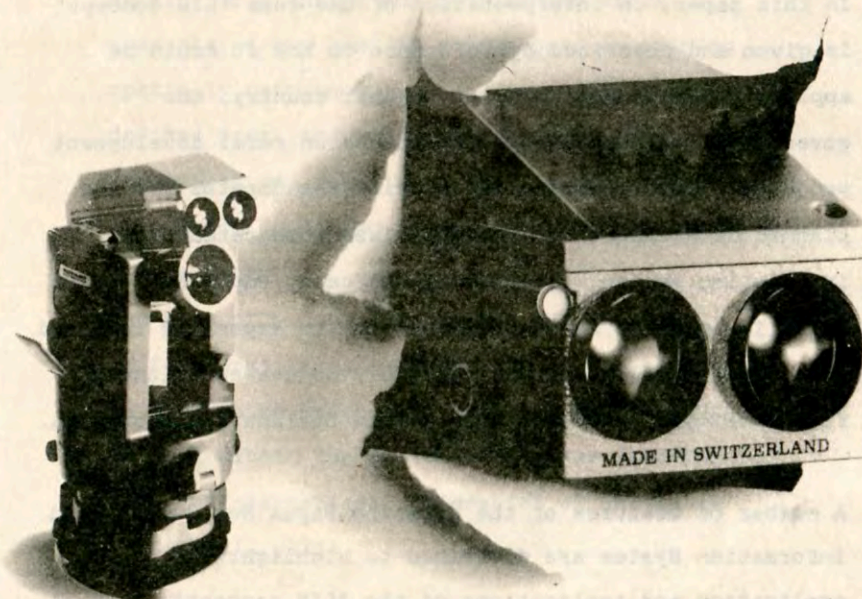
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The LIS Concept in Developing Countries: Papua New Guinea
as a Case Study.

D.N. Pullar M. Surv (Otago), MNZIS.

ABSTRACT

In this paper, an interpretation of the term "LIS concept" is given and described by reference to how it could be applied to Papua New Guinea. In that country, the government has placed some importance on rural development projects. This emphasis may provide the impetus for the planned development of a computerised integrated land information system. If that is the case, Papua New Guinea is unlikely to be self-sufficient in the expertise required for such a development and is likely to use consultants from developed countries such as New Zealand and Australia.

A number of features of the existing Papua New Guinea Land Information System are described to highlight the application and implications of the "LIS concept". Many of these issues should have parallels in other developing countries.

INTRODUCTION

To date the most generally accepted definition for "land information system" is the FIG definition.

"A Land Information System is a tool for legal, administrative and economic decision making and an aid for planning and development which consists on one hand of a data base containing spatially referenced land-related data for a defined area, and on the other hand, of procedures and techniques for the systematic collection, updating, processing and distribution of the data.

The base of a Land Information System is a uniform spatial referencing system for the data in the system which also facilitates the linking of data within the system with other land-related data." (International Federation of Surveyors (FIG) 1981, p219)

However, some writers consider this definition to be too general (Hamilton & Williamson 1984, p4) (Lyons & Eden 1984, p2). To overcome this difficulty, Lyons and Eden (ibid.) suggest that it is more appropriate "... to define the sub-systems which make up the total system rather than attempt a precise definition of an LIS per se." Applying this approach to New Zealand, a taxonomy can be defined that describes the "total" system, the New Zealand Land

Information System. Such an approach has been taken in New Zealand (Jones & Pullar 1984) to describe the largely manual sub-systems making up the New Zealand Land Information System (Figure 2). The "taxonomy approach" to describing a land information system, has the advantage of giving as detailed a picture of the system as is required. A single level of the taxonomy gives a broad view of the land information system whereas a more detailed view can be obtained by including further levels.

In addition to giving a description of a land information system, a taxonomy can form the basis of a conceptual model of a national (or state) land information system, or sub-system of such a system. This important design stage in the computerisation of an existing component or sub-system, aims to give a generalised view of end-user requirements tempered by the available technology.

However, in this paper, the emphasis will be on developing a taxonomy for the Papua New Guinea Cadastral System, albeit at a fairly general level of detail. This emphasis is in line with the writer's own experience as a cadastral surveyor in both Papua New Guinea and New Zealand. It will concentrate on one major component of a national land information system, that component which has been called the Multipurpose Cadastre. In both New Zealand and Australia, initiatives taken in developing integrated, computerised land information systems have begun with projects to computerise various cadastral sub-systems

within this component of the land information system. It is unlikely to be any different in Papua New Guinea and in fact it could be a move towards registering customary interests in land which provides the impetus for the computerisation of other cadastral sub-systems.

It must be emphasised that national land information systems already exist in both New Zealand and Papua New Guinea although they are in manual forms. The difference between a completely manual and an at least partially computerised land information system, is that computerisation presents an opportunity to rationalise the inherent inefficiencies in the manual sub-systems and also to integrate the various sub-systems into a single "total" system. A "total" system obviously must be a long-term objective, but if the correct choices are made in the initial stages of development, it remains a viable objective.

This then is the LIS concept. It is the wider view of the whole "total" system including all the sub-systems whether they exist in manual or computerised forms together with a growing appreciation (as knowledge is accumulated) of the duplication that exists between sub-systems. As this understanding grows, so do the solutions become more apparent as to how the various sub-systems will be linked together in an integrated system.

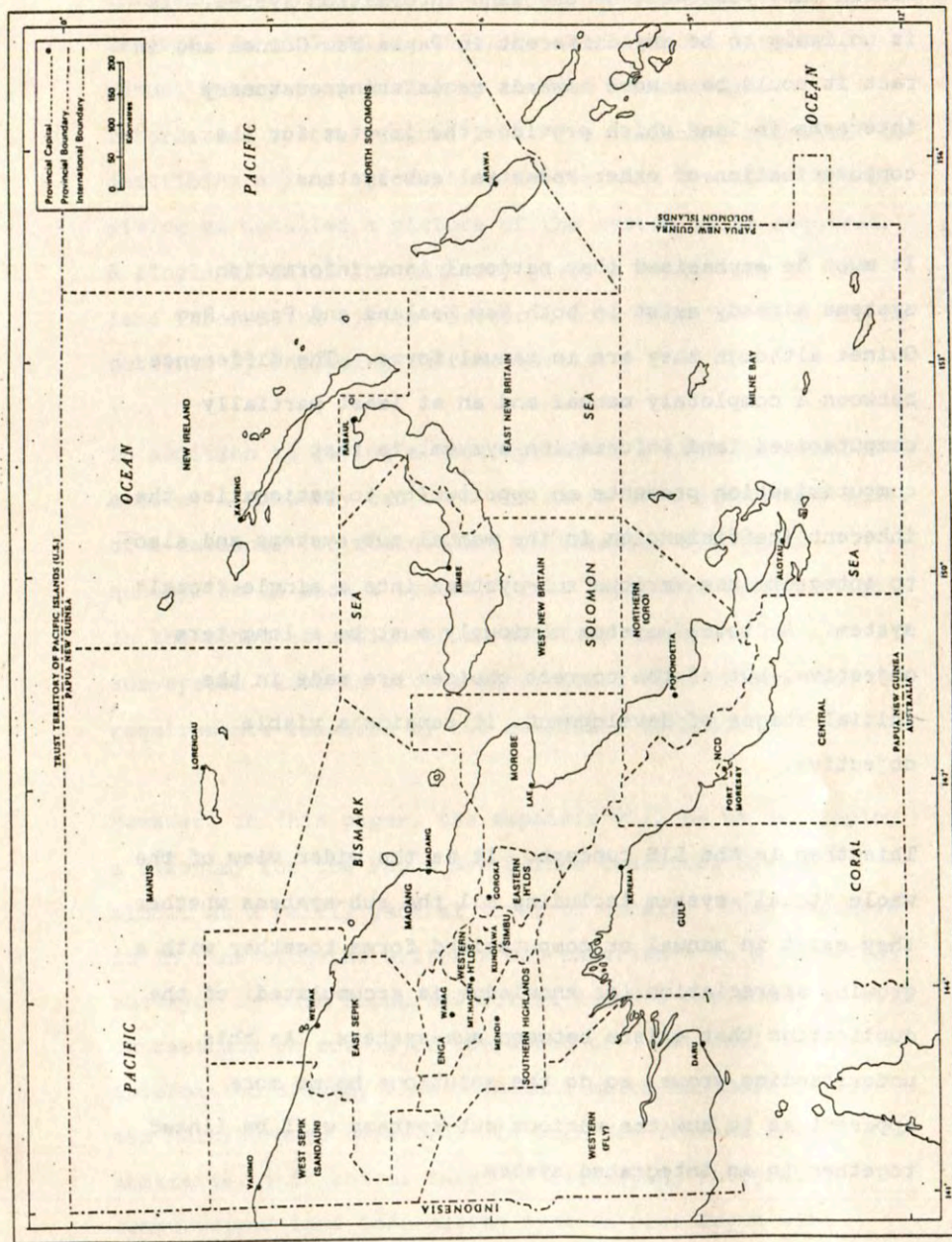


Figure 1. Map of Papua New Guinea (King & Ranck 1982, p19)

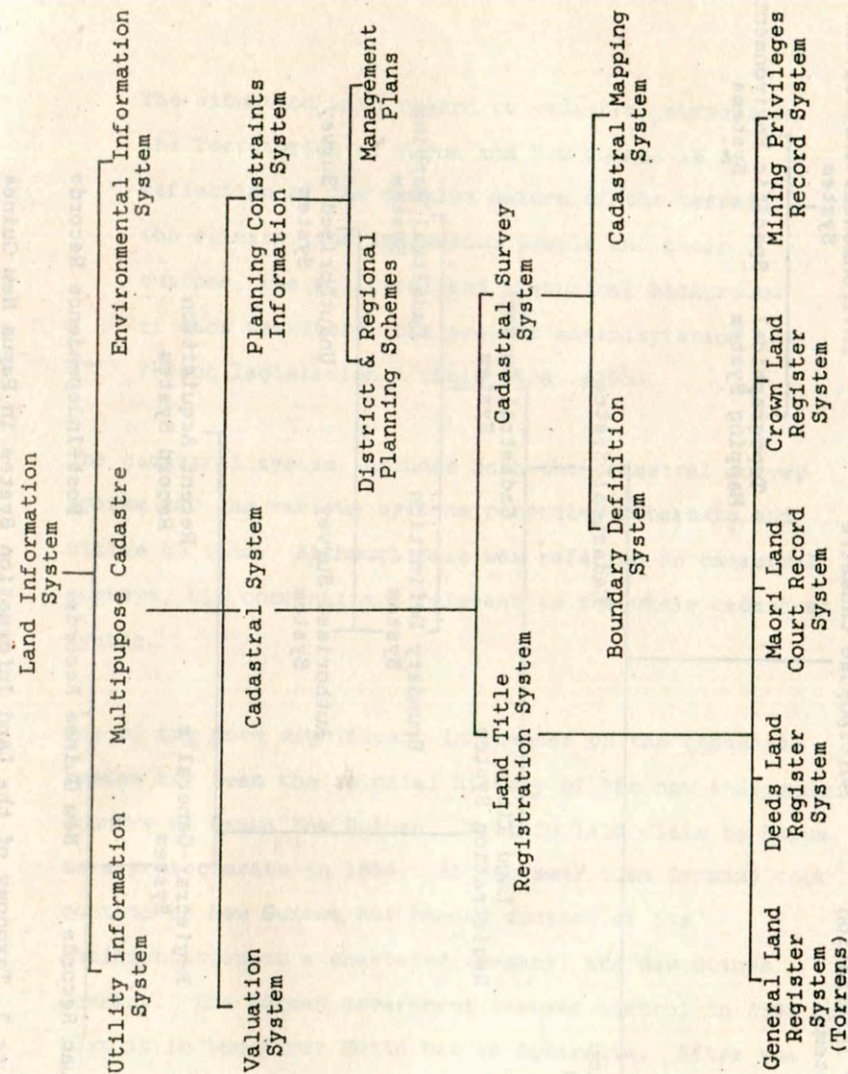


Figure 2. Taxonomy of the Land Information System in New Zealand, modified from (Jones & Pullar 1984, p40)

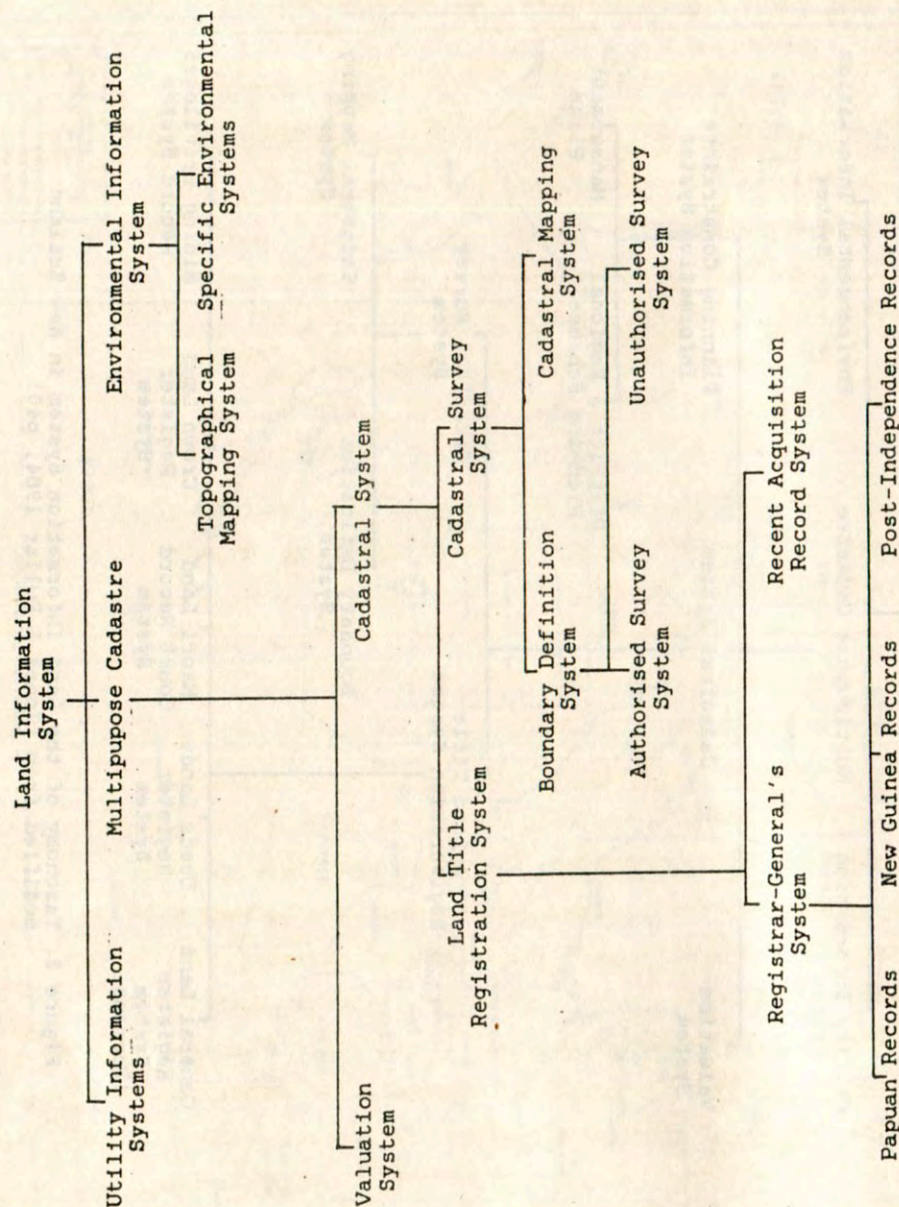


Figure 3. Taxonomy of the Land Information System in Papua New Guinea

PAPUA NEW GUINEA CADASTRAL SYSTEM

The situation with regard to cadastral surveys in the Territories of Papua and New Guinea is a reflection of the complex nature of the terrain, the climate, the indigenous people and their customs, the political and historical background of each territory, the present administration and recent legislation." (Dale 1976, p255)

The cadastral system includes both the cadastral survey system and the various systems recording interests and titles to land. Although Dale was referring to cadastral surveys, his comments are relevant to the whole cadastral system.

One of the more significant influences on the cadastral system has been the colonial history of the now independent country of Papua New Guinea. Britain laid claim to Papua as a protectorate in 1884. At the same time Germany took control of New Guinea but handed control of its administration to a chartered company, the New Guinea Company. The German government resumed control in 1899 but lost it in the First World War to Australia. After the First World War, Australia remained in control of New Guinea by virtue of a League of Nations mandate. During the Second World War, New Guinea fell under the control of the Japanese. Following the defeat of the Japanese,

Australia resumed the responsibility for administering New Guinea this time as a United Nations Trust Territory. This was the end of separate administration for Papua and New Guinea and from this time through to independence in 1975, they were administered together.

As in any cadastral system, many of the records which describe current rights in land were created when the forms of administration were different from those now in operation in Papua New Guinea. The number of different forms of colonial administration that Papua New Guinea has experienced over the last hundred years makes this system particularly complex.

To become fully aware of the complexity of the systems of land tenure in Papua New Guinea, it must be remembered that alienated land for which written records of title are held constitute only 3% of the total land mass. The remaining 97% of land is held under customary ownership. There are certain common features to the customary tenures found throughout Papua New Guinea such as the absolute ownership of land being vested in the group or clan as well as the controls over its use and transfer. There are also many differences from area to area. These differences arise from the cultural variety found in the people of Papua New Guinea which is evident in a number of ways including the customs affecting land.

Table 1

DOCUMENTS HELD IN THE OFFICE OF THE REGISTRAR GENERAL

Position as at 30th June 1979

Certificates of Title - Papua	824
Certificates of Title - New Guinea	2422
Crown Leases	8879
Government Leases	11913
Unregistered Administration Lands	1682
Leases, Natives to the Crown	198
Deeds of Attestation	2538
Crown Grants	489
Provisional Crown Grants	93
Mining Leases	63
Deposited Plans	113
Miscellaneous Plans	826
Final Orders	2691
Conversion Orders	1025
Powers of Attorney	1114
Register of National Land	11

34881

(Parker 1979, pl.43)

Table 2

Total land area of Papua New Guinea	461,000 square km
Freehold land	2,200 square km
Leasehold land	13,000 square km
Government land	3,300 square km

(Parker 1979, pl.26)

Perhaps another statistic that gives a better idea of this variety is that Papua New Guinea, which has a population of 3 million, has about 700 different languages.

The variety of documents recording registered interests in land is evident in Table 1. One notable feature that is borne out by the numbers in both Table 1 and 2 is that leasehold title is considerably more common than freehold. This is a result of deliberate policies dating back to the early colonial administrations, particularly in Papua. Since independence, this philosophy has gone further than the colonial policy of only offering leasehold land for disposal. Now legislation (Land (Ownership of Freeholds) Act 1976) encourages owners of the remaining freehold titles to convert to leasehold tenure. In Table 1, the different categories of documents reflect some of the different eras of colonial administration.

- Crown Leases are registered leases granted by the State prior to independence in Papua.
- Government Leases are, strictly speaking, registered leases granted by the State since independence for the whole country. However, it appears that Administration Leases, the New Guinea equivalent to Crown Leases, have been included in this category by Parker in compiling the data for Table 1.
- Unregistered Administration Leases are documents recording land purchases in New Guinea.
- Deeds of Attestation are documents recording land purchases in Papua between 1892 and 1963.
- Crown Grants are the original freehold grants from the Crown to the first owners.
- Final Orders are documents recording the Court's findings in the case of land in New Guinea alienated before the Second World War. During the Japanese invasion of New Guinea, the New Guinea Land Registry was destroyed. The New Guinea Title Restoration Act 1951 established the procedures for restoring the titles to this land.
- Conversion Orders are the records of freehold titles that have been converted from land previously held under customary tenure.
- Register of National Land results from an initiative since independence to reduce the seemingly endless demands by some original customary owners for compensation from the government for past land acquisitions. The National Land Registration Act 1977

sets out the procedures to establish the government's final unchallengeable claim to land dealt with under this Act. The National Lands Commissioner also determines compensation claims for this final settlement.

Up until the beginning of 1986, the Office of the Registrar General was part of the Justice Ministry. It is now part of the same department as the Surveyor General, the Department of Lands and Physical Planning. This means that the headquarters of the Department of Lands and Physical Planning, located at Waigani, holds not only the records of the Registrar General but also a set of all the cadastral survey plans and one other category of cadastral records. These are the Native Land Dealing documents which record more recent land acquisitions. The predominance of leasehold land and this department's responsibilities to administer these leases (which includes valuation and planning functions), in addition to its role in the land alienation process, results in the Department of Lands and Physical Planning holding the most comprehensive record of interests in alienated land. The Department of Lands and Physical Planning has offices in many of the 19 provinces. Well established Regional Offices are found in Boroko (Port Moresby), Rabaul, Madang and Mount Hagen. The latter three offices have duplicate copies of many of the land records that affect land within their region.

The cadastral survey system has been influenced by cadastral systems operating in the various states of Australia, particularly Queensland. However, it also has some features that are unique to Papua New Guinea. One such feature is the two tier approach to surveys which has been used to support the acquisition of customary land; authorised and unauthorised surveys.

Authorised Surveys are regulated by two Acts and are carried out by, or under the supervision of, registered surveyors. The two Acts are:

- the Survey Act 1969 whose purpose is "to provide for the registration of surveyors and the regulation of the practice of land surveying"; and
- the Survey Coordination Act 1967 that gives the Surveyor General power to coordinate all surveys in Papua New Guinea and thus avoid duplication.

The Surveyor General regulates the practice of surveying with the Survey Directions which are the Papua New Guinea equivalent to the New Zealand Survey Regulations. However, only authorised surveys come under the jurisdiction of these two Acts and the Survey Directions. Standards of accuracy and the presentation of survey data on plans, of this type of survey, are similar to those required in New Zealand.

The existence of survey control within towns and, to a lesser extent, within rural areas means that there is now a lesser dependence on sun observations as the means of controlling bearings on cadastral surveys. In 1980, there was a general tightening up in the Survey Directions of how Grid North (the standard meridian in terms of UTM) was to be determined with more emphasis put on using the survey control. Much of the country had some form of survey control although there are still many surveys where astronomical observations are needed to establish Grid North. The organisation charged with providing survey control is the Central Mapping Bureau which is separate from the Department of Lands and Physical Planning, but still under the control of the Surveyor General.

The other type of surveys are Unauthorised Surveys.

From the earliest colonial days, there have been insufficient surveyors to survey all the land that has been alienated and so another type of survey, an unauthorised survey, has been accepted by the Registrar General for acquisition purposes and titles have been issued "Subject to Survey". These surveys were only meant to be a temporary measure until a full authorised survey was done but few parcels of land are resurveyed to uplift this limitation on their title unless the land is subdivided or the land becomes subject to dispute. Most of these unauthorised surveys have been done by Patrol Officers at the time of their investigation report for alienation, but recently other government officers such as Land Settlement

Officers and agricultural advisors have become involved. These unauthorised surveys are usually done by compass and chain and checking of the plans of these surveys is far less stringent than for surveys done under the Survey Directions. Although hardwood pegs are supposed to be the minimum type of ground marking used on these surveys, it was a common practice of Patrol Officers to use only a small stick as ground marking that they could sight to with their compass as a back sight. The standard of these surveys is not very high and gross errors such as the orientation of the survey being 180 degrees out or the location of parcels being many kilometres out of position, are not uncommon.

Strictly speaking the Survey Act 1969 defines any cadastral survey as an authorised survey, including acquisition surveys, and therefore requires that they are surveyed in accordance with the Survey Directions. However, this requirement was overlooked until 1983 when the addition of Part 13 to the Survey Directions specifically identified acquisition surveys and described the requirements for them. This included the need for the appropriate Regional Surveyor's signature on the plan of any acquisition survey to indicate compliance with the requirements of the Survey Directions. The aim of Part 13 of the Survey Directions to upgrade the standard of acquisition plans has not been completely met. In some regions acquisition plans not in terms with the Survey Directions continue to be accepted for alienation purposes and the subsequent issuing of

titles.

The present system of cadastral mapping was adopted in 1956 using sheet-lines that gave national coverage at a scale of four miles to the inch (Fourmil). The Fourmil sheets were further subdivided to give coverage at one mile to the inch (Milinch) which in turn were subdivided (in some areas) to give coverage at half a mile to one inch (Hamil). Although those mapping series have been subsequently metricated to scales of 1:250,000, 1:50,000 and 1:25,000 respectively, they are still known as the Fourmil, Milinch and Hamil series. The Fourmil series also provided the basis for a series of meridional circuits with the standard meridian for all surveys within the area covered by a Fourmil sheet being True North at the southwestern corner of the Fourmil. The Survey Directions 1980 changed the standard meridian to be used for cadastral surveys from the Fourmil Standard Meridian (FSM) system to three UTM zones (54, 55, and 56) that span Papua New Guinea. In gazetted urban areas, other maps at larger scales are used to record the current subdivisional pattern.

These two different forms of cadastral mapping also form the basis of appellation in Papua New Guinea. In rural areas, appellations are based on the Milinch and Fourmil sheets. There are usually nine Milinch sheets to one Fourmil sheet. A three tier system of appellation works with the allocation of a unique Portion number for each parcel of land in a Milinch which is part of a larger

Fourmil. eg Portion 3, Milinch of Hagen, Fourmil of Ramu. In urban areas appellations are also a three tier system. Urban areas are actually gazetted as such and include Towns, Government Stations and Patrol Posts. An urban area is broken down into Sections and so an individual parcel is given a unique allotment number for a particular Section for that urban area. eg. Allotment 53, Section 40, Town of Mount Hagen. Allotment 6, Section 1 Mount Au Patrol Post. There are, however, some cases where larger parcels of urban land take the rural form of appellation.

This brief description of the Papua New Guinea cadastral system has attempted to explain the taxonomy of that system as portrayed in Figure 3. A comparison with a taxonomy describing the New Zealand system highlights both the differences and similarities between the two systems. One important difference not evident in those two figures is that, because Papua New Guinea is a newly independent country, there is a greater likelihood of significant changes being made to existing land administration systems which were vested to them by their previous colonial masters. Williamson (1983, p8) makes the point that

"In general, the only way that change will come about is in slow incremental steps. Major change can only occur because of a total commitment by the respective government. Such reforms usually accompany basic social changes within a country..."

In New Zealand, changes must be "in slow incremental steps" to be acceptable, whereas in newly independent countries, providing there is "total commitment" by the government, slightly larger steps may be possible as the government attempts to develop its own unique character and identity. The following section examines some of the changes made to the Papua New Guinea cadastral system since independence and the implications of these changes on the possible computerisation of components of the cadastral system to form the "core" of a computerised land information system.

EVOLUTION OF THE CADASTRAL SYSTEM

It is generally accepted that the successful implementation of an innovation to the cadastral system of one country does not automatically guarantee its successful implementation in another country. For this reason, although one country's experience is useful, it must be carefully evaluated before it is "transplanted" into another country.

For instance, in some cases there are certain common features between cadastral systems which perhaps result from having had the same colonial power. The colonial power may have introduced the same land administration systems, such as the Torrens System of title registration, to many of its colonies. However, if two such former colonies are compared, one that has recently obtained its

independence; the other that has had self-government for a considerable time; then there will be some obvious differences in the workings of the two Torrens Systems. The country which has more recently been a colony, is more likely to have an implementation of the Torrens System that is very similar to the original nineteenth century implementation. The other country whose colonial past is long ago, has had a long time of self-government in which to develop the system to meet the needs of its citizens. A similar observation can generally be made with other systems of land administration and survey systems which were introduced during colonial administrations.

In Papua New Guinea, the relative insignificance of existing land administration systems becomes apparent when the total area of land is compared to the area of land recorded in these systems (Table 2). With only 3% of the land recorded in these systems, they run the risk of becoming increasingly irrelevant unless they can be adapted to cater for a larger proportion of land or form the basis of new systems. Although valiant attempts have been made to modify the systems of title registration to reflect the indigenous people's aspirations, it has been hard work and many attempts at reform have not been as successful as originally hoped. It has been argued (Dickson & White 1981), that customary law is far more responsive to the needs of the community. Likewise, Bacon (1984, p2) makes a similar observation of the "...traditional sector of the economy [in developing countries], often supposedly closed

in its way, but in reality nevertheless undergoing continuous transformation". These observations lead to the conclusion that if possible the underlying principles of customary law relating to land tenure should be incorporated into statutory law. Dickson and White recognise that this is not an easy task.

"We have not accepted that either philosophy being so fundamentally different can assimilate successfully some of the principles of the other so the only alternative appears to be carefully planned integration of the two philosophies and to define the areas in which the two will apply."

(Dickson & White 1981, p358)

Although traditional forms of land tenure "provide the unifying bonds which hold traditional rural societies together" (Bacon 1984, p3), these forms of land tenure do not encourage rural development. The traditional forms of land tenure are not considered to be suitable security against loans raised for development purposes. There needs to be a "transformation of land tenure institutions of the traditional sector into forms which better match development goals" (ibid.). Perhaps it also needs to be mentioned that lending institutions which operate on western ideas of "security" also need to change their thinking so that they are more in harmony with the society in which they are operating.

However, any changes to existing institutions need to be carefully considered and be incremental in nature (Williamson 1985, p23). Even if the change is incremental, if it is too great, it will not be accepted.

In Papua New Guinea, during the 1970s, a report by a recognised expert in land tenure, Mr S.R. Simpson, resulted in proposed new legislation. However, when it was introduced into Parliament, it caused a great deal of dissension and the legislation was eventually withdrawn. The subsequent lack of action by successive governments to deal adequately with the underlying problems that Simpson identified in his report has held back development in the rural areas. This means that both the present customary and western-derived forms of land tenure are not meeting the needs of a significant group of Papua New Guineans. These Papua New Guineans are those who wish to develop the customary land in which they have an interest through their tribal affiliations.

Some appreciation of the scope of this problem was gained from the experience in the early 1980s when existing institutional arrangements were used to overcome the difficulties local people were having in raising loans to develop their own rural land. Using the provisions of the Land Act, the government would lease customary land from the owners using normal acquisition procedures. Then other provisions of the Land Act were used to lease the land back

to a duly incorporated business group comprising the original customary owners. This particularly cumbersome arrangement was called "Lease-leaseback" (Montgomery 1979, p23) and became particularly popular with a large backlog of applications building up. As well as the backlog of applications, it was a particularly bureaucratic procedure with delays of up to three years not being uncommon. In 1983 this practice was temporarily halted after a legal opinion concluded that it was a misuse of the Land Act. A subsequent amendment to the Land Act means that it is still used not only for agricultural developments, but also for commercial (tradesstore) and light industrial (service stations) developments on customary land.

The popularity of the lease-leaseback arrangement demonstrated a genuine need for new forms of land tenure which would allow the indigenous people to realise their ambitions to develop their own land. Therefore, the issue is not whether there is a need for new forms of land tenure, but what form they should take. To be acceptable, there are certain essential elements that should be incorporated.

1. Government institutions and procedures that are familiar to the local people should be used. For instance, the Patrol Officer or District Officer (Lands) should carry out an investigation similar to the type of investigation undertaken for acquisition purposes and this should take place at the same time as

the boundary survey.

2. It is essential that the process to change from customary land tenure is carried out at the request of the local people. This rules out a systematic approach to bringing all the land in a particular area under the new form of land tenure. However, it does not preclude an intensive education programme being conducted in a particular area to point out the advantages of the new system. To be successful, extra government personnel should be available in that area to cope with the extra investigation and survey work that might result from such an education programme. In Papua New Guinea, there is not an abundance of government personnel with suitable skills for this work. This means that this work would need to be given priority over other government functions carried out by these public servants or the option of employing consultants considered.
3. The new process should be prepared to record descendants of the original people listed on the title so that ownership lists (that are part of the title) are capable of being updated. They should also be capable of being corrected when interests recorded within the tribal group are omitted. This should not allow future claims by members of other tribal groups to challenge the original findings of the investigation on which the title was based.

4. The disposal of land held under this form of tenure should be subject to some sort of review so that the sale does not unduly prejudice the customary rights and privileges of all the members of the tribal group who own that land, including future generations.

These elements are most likely advisable features in any developing country and in fact there are lessons to be learnt from countries such as New Zealand where the issue of Maori land has seen the development of specialised institutions to deal specifically with Maori land.

On the technical side of the cadastral system, the cadastral survey, there are also parallels that can be made between New Zealand and Papua New Guinea. The Unauthorised Surveys which define a considerable proportion of alienated rural land could be compared with the unsurveyed partition orders of the Maori Land Court. Unsurveyed partitions have a relative advantage of at least being surrounded by surveyed parcels. However, in Papua New Guinea where "isolated" surveys have been the norm and there is only a small percentage of alienated land, some large discrepancies have resulted in the location of parcels relative to other parcels where they are only defined by unauthorised surveys.

The move in 1983 to have all new acquisition surveys surveyed in terms of Part 13 of the Survey Directions has not proved to be completely successful and some acquisition

plans not complying with the Survey Directions are still being accepted. The Survey Directions allow compass and chain surveys but demand proper ground marking and surveys to be located by determining UTM coordinates for at least one boundary mark. Plans lodged under the Survey Directions are also subject to proper examination procedures by the Regional Surveyor. In the Highlands Region in particular, there has been a strong emphasis given in recent years to these chain and compass surveys by the Regional Surveyor because of the low cost of survey, the relative speed of completing a survey, and the skill levels of the available survey staff.

This section has addressed two areas of the Papua New Guinea cadastral system where recent initiatives have been made at reform. These reforms were directed at improving existing cadastral institutions so that the cadastral system itself would not be a disincentive to rural development. Although these initiatives and a number of others, made in the last decade have met with only limited success, it is important that administrators and politicians continue to explore new options so that the cadastral system is better able to change to meet the needs of all Papua New Guineans.

RURAL DEVELOPMENT

In a developed country the cadastral system is perceived primarily as a protector of an individual's rights in land. However, in a developing country, although it provides this

function, it is perceived more as a tool to assist rural development. The importance placed on rural development by governments of developing countries not only aims to improve the standard of living of the rural population, but also endeavours to exploit certain resources that generally are renewable for the benefit of the whole country. If the land does not have a title capable of being registered, this can thwart development proposals. Therefore, in the planning of rural development projects, whether they be foreign aid projects or not, attention must be given to the cadastral operations required for the project. These requirements may have implications on the cadastral system beyond the scope of the development project alone. For this reason, planning for these projects not only needs information about the physical, biological and human resources of the area but also information concerning the demands that will be made on the cadastral system to achieve the specified development goals. A result of these requirements is that many components of the total Land Information System can be used in the planning of rural development projects.

The main emphasis of this paper has been on the cadastral system. The reason is that the cadastral system is the only component of the Land Information System with relatively comprehensive coverage at reasonably large scales. Although the Milinch series is not complete, there is coverage over large areas of the country particularly where most survey and land alienation activities occur.

The only other component with national coverage is the 1:100,000 topographical mapping series produced by the Central Mapping Agency, with assistance from the Australian Army. This mapping was produced in the 1970s and is now becoming dated. In developing areas a considerable number of new roads make the "age" of this mapping very obvious. Resource mapping is even more restricted, being limited to the production of maps appearing in the "Papua New Guinea Atlas" (King & Ranck 1982). Some resource inventory work is undoubtedly done to support rural development project planning, but apart from the University of Papua New Guinea, there are no agencies operating on a national basis as would occur in a more developed country.

In spite of the small amount of resource inventory work that has been completed, the apparent lack of coordination of this work could become a key issue, if Papua New Guinea ultimately decides to develop an integrated, computerised Land Information System. The extent of coverage, the standardisation of resource data classification systems and standardisation in the map presentation of the data need to be addressed. This becomes even more critical if experts from different countries are employed as consultants for different projects. In the absence of a distinct national style of resource mapping, the consultants will inevitably modify their own home country's way of doing things which may be quite adequate for a particular project, but this may limit the use of their work for other purposes at a later date.

Another key issue affecting rural development in developing countries such as Papua New Guinea, is the availability and structure of government services at the local level in rural areas. In most rural areas within Papua New Guinea, there operates a modified version of what has been described as the "integrated prefectorial" approach (Bacon 1984, p4).

"Under this approach, the prefect (central government's general representative at regional and district level) is part of the chain of command between headquarters and the region for all government departments involved in the development process, whether administrative or technical, and it is he who embodies the authority of all ministries as well as the government generally, and serves to effect 'horizontal' control over 'vertical' lines of command, resulting in better coordination and interdepartmental liaison at regional and district level." (ibid.)

In Papua New Guinea, this approach is modified because of the decentralisation of certain political and administrative powers from the National government to 19 provincial governments. The Department of Lands and Physical Planning remains largely under the control of National government although a number of former National

Government departments are now under the control of provincial governments. The Department of Lands and Physical Planning is unlikely to escape the move towards the decentralisation of National Government functions. Already two provinces have certain Land Board functions vested in them.

During the colonial times, the senior Patrol Officer held the role of "prefect" in the approach described above. Now, the role of Patrol Officer has been absorbed into the provincial government department responsible for the overall administration and development of each province. Therefore, at the local level, the senior officer of this department (eg Department of Western Highlands) performs the role of "prefect". This officer only has authority over government services that have been decentralised, to provincial governments and this can cause difficulties when a request for government services that have not been decentralised is declined or not given the same priority as the officer in the "prefect" role would prefer. Nevertheless, the system does work, and in areas where rural development initiatives are successful the officer in charge of that area can take part of the credit. Without one person being responsible for bringing together the various government services to assist the local people, rural development projects can fail to get off the ground.

The involvement of the senior officer of the provincial government at the district level, in the land acquisition process has resulted in a copy of the acquisition records often being held at this local level. This officer (or his predecessors) is likely to have carried out the investigation report and acquisition survey and so in most cases a duplicate copy is held in the local office. These records assume some importance in the case of land dispute that are not uncommon in Papua New Guinea. Previously, the quick and decisive intervention by this officer armed with all the relevant information, would have solved the dispute and prevented it from developing. Now, it is more common for disputes affecting land to be handled by the Senior Lands Officer (Department of Lands and Physical Planning) (Miller 1986). That officer may or may not have immediate access to the relevant acquisition records.

The encouragement of rural development is an important function of government in a developing country. This encouragement takes many forms including the provision of cadastral services. In Papua New Guinea, the National and provincial governments must work together if this function is to be performed effectively. In the future, the National government may need to play a significant role in coordinating resource inventory work. Papua New Guinea is relatively rich in resources when compared with many other developing countries. Apart from the exploitation of various mineral resources such as at Bougainville and Ok Tedi, it is the agricultural projects in the rural areas

that might well offer the most to the country in the long term. These projects, if carefully planned and managed use resources that are largely renewable. They allow the land to be used many times and thus give security to the rural population.

LIS CONSIDERATIONS

In the previous section, mention was made of the decentralisation of certain political and administrative powers from the National government to the 19 provincial governments. There are certain advantages in the initial stages of computerisation of land information sub-systems if the sub-systems remain centralised, particularly in the ability to standardise and the ease of data capture where it occurs in just one location. Of course there is a major drawback to a centralised system in that information is geographically remote from a large percentage of the users of the information. Despite this, the decentralisation of cadastral records and functions, other than duplicate records, should be resisted until after computerisation. One reason is that there is already a considerable number of variations in cadastral records without adding to them by allowing provincial governments to enact their own land legislation. Another reason is the establishment of up to 19 provincial repositories of cadastral records would require considerable expertise if it was to be done properly and Papua New Guinea, like any developing country

does not have a surplus of that type of expertise. However, once initial computerisation is complete, decentralisation of cadastral records can be investigated and at that stage advantage could be made of the technology available to achieve that goal.

The existing sub-systems do not have the same volume of records when compared to the equivalent sub-systems in New Zealand. For example, the total number of documents formerly held by the Registrar General is 34,881 (see Table 1) whereas in New Zealand, there are over 2 million titles alone without considering the documents supporting those titles.

Together the size and the centralised nature of the Papua New Guinea Land Information System mean that computerisation of the existing sub-systems is not as large or as complicated a task as the similar task in New Zealand. However, Papua New Guinea has the issue of customary land which, although it is not part of the present institutionalised Land Information System, in the future could form the basis of new sub-systems.

The development of a computerised Land Information System provides the means of implementing a more integrated system. However, without adequate systems of survey control, mapping and cadastral surveying, the development of an integrated system is virtually impossible.

"In any event, it will be clear that there can be no short cuts to an integrated system. Sound geodetic, cadastral and mapping systems hold the technical key and there is undoubtedly much improvement and preparation to be done to provide a viable frame for the correlation, recording and integration of land data on a coordinate and land parcel basis." (Hawkey 1985, p15)

LIS CONSULTANTS IN DEVELOPING COUNTRIES

Any consultants advising the government of a developing country on either the computerisation of the "total" Land Information System, a component or even a single sub-system of the total system, will have to acquire an understanding of the existing cadastral system.

"...an indepth understanding and appreciation must be gained of the legal, technical and administrative aspects of the existing land law and tenure, and the land registration, conveyancing, cadastral survey and mapping and land development processes." (Williamson 1985, p23)

Therefore in a country such as Papua New Guinea, where most of the total land mass is held according to customary law, "existing land law" would include customary law to do with

land. The other "mandatory" requirement identified by Williamson is an understanding of the social, political and economic needs of the respective country.

This sort of insight into another country's makeup, and in particular its existing cadastral system, is not gained over night. Obviously people with local experience should be included in any project team to supplement the consultant's expertise. Williamson (ibid.) has identified a number of general principles which should be followed in any land titling project. Most of these principles can also apply to any project that makes modifications to the existing cadastral system. These principles are:

1. All change should be incremental and evolutionary and should be based on the existing operational administrative structures wherever possible.
2. Existing technical and administrative procedures should be adopted as much as possible.
3. The approach should require minimal legislative changes, particularly to basic law.
4. The project should be promoted and designed such that it receives full public support. The system should be easily understood and accepted by landholders.
5. Appropriate procedures and technology should be utilized.

6. The administrative system should be decentralised. It should be taken to the people.

7. Most important of all the system should be SIMPLE both technically and administratively.
8. Planning cannot be separated from implementation.
9. Computerisation should only be introduced into proven, operational and efficient systems.

(Williamson 1985, p23-25)

Although this list of principles and the need for local knowledge may appear daunting to the would be consultant, there are a number of surveyors from New Zealand and Australia who have had experience in many of the developing countries in the South Pacific region. Within New Zealand there are surveyors with experience in Indonesia, Sarawak, Fiji, the Solomon Islands, Papua New Guinea and Western Samoa to name but a few. These surveyors have been part of both formal and informal foreign aid programmes in mapping, survey control projects and in training indigenous surveyors.

It seems likely that in the future requests for foreign aid will include advice on the design and implementation of computerised land information systems. Australian consultants already have experience in this area in Thailand, Brazil and Tunisia and are actively promoting their expertise in the land information system field to other countries. For instance "The Australian Surveying Industry" is a document prepared by the Australian Survey

Office. It is aimed at "...assisting the promotion of the Australian Survey Industry overseas", and is a very comprehensive report.

Although the Australian Survey Industry is larger than New Zealand's, the skills and resources of the New Zealand Survey Industry available for overseas work are very similar to those ascribed to Australian surveyors. In some areas, New Zealand surveyors may have certain additional skills. For instance, they are experienced in a more integrated survey system that has a good survey control network and does not have the problems of isolated surveys. They are also familiar with regional repositories of cadastral survey and title data that allows basic land information to be available at a local level instead of a single central repository of information geographically remote to a large percentage of users.

The efficiency of the consultant's "home" system, however, is irrelevant without the experience and sensitivity to become familiar with another country's existing system and the aspirations of the people as to what is expected of the system. The consultant, when advising in another country, must be able to dispassionately stand back to examine any other cadastral system and determine the "core" components that may have application in the particular developing country. This applies particularly to new technology.

"Only the core of the technological process must be transplanted if western aid is to be successful. The core of a process is that which is scientifically essential. Those practices and concepts which are the product of the alien culture must be detected and discarded prior to transplantation." (Toft 1967, p1)

CONCLUSIONS

The cadastral system and how it operates are important factors in planning rural development projects in developing countries. In Papua New Guinea, reforms to the cadastral system to encourage rural development are overdue. Such reforms, when they come, may provide the impetus for the planned development of a "total" integrated land information system in Papua New Guinea. In such an event, computerisation will begin with one or several of the cadastral components of the Land Information System as it has in New Zealand. There are certain lessons to be learnt from developed countries in both the design of individual sub-systems and the "total" system. Consultants from countries such as New Zealand and Australia could provide this expertise. However, consultants should be aware of the need to know the nature and workings of the existing systems together with an appreciation of the aspirations of the indigenous people especially their feelings for their land. With this awareness, the

consultant's advice could help to implement changes to systems that would allow the systems to work for the people rather than be reminders of their colonial past.

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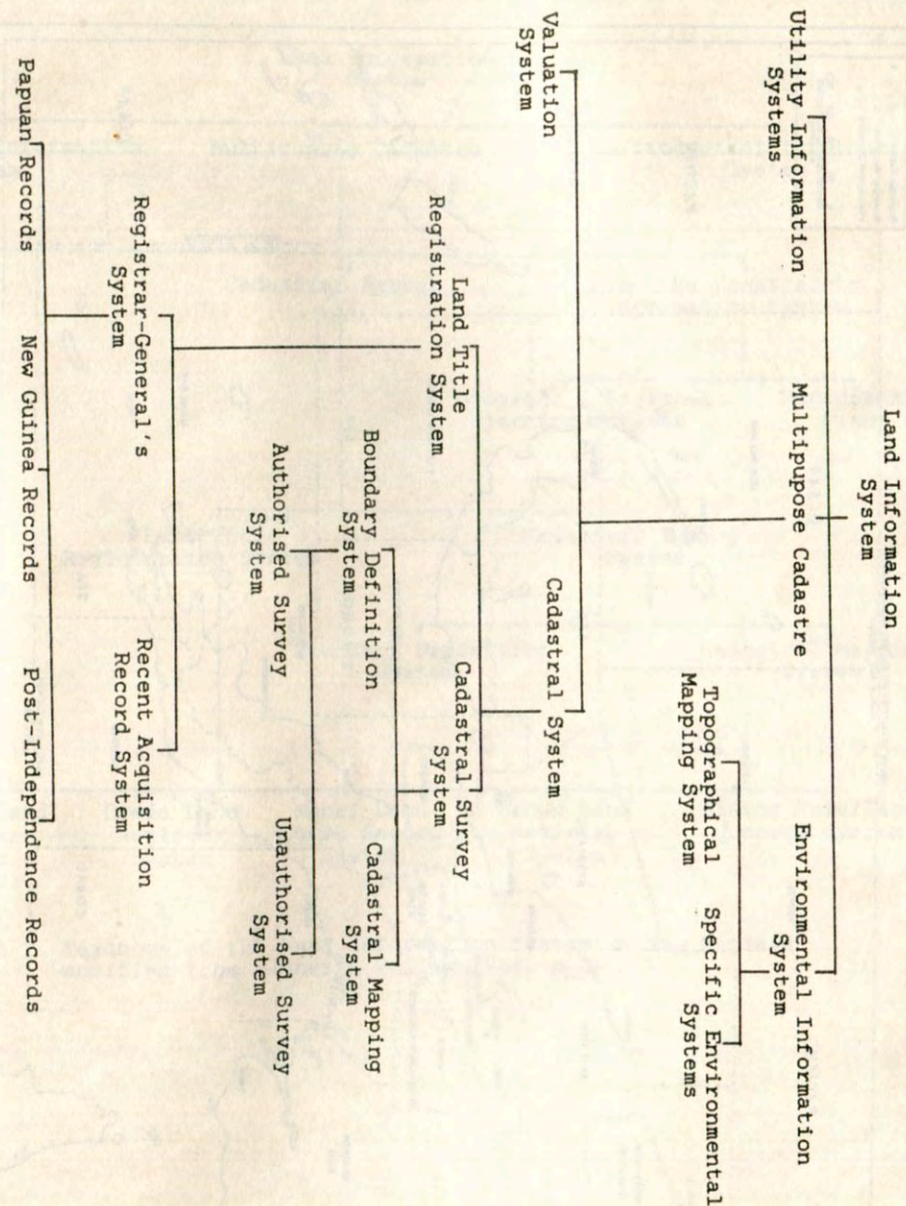
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Figure 3. Taxonomy of the Land Information System in Papua New Guinea



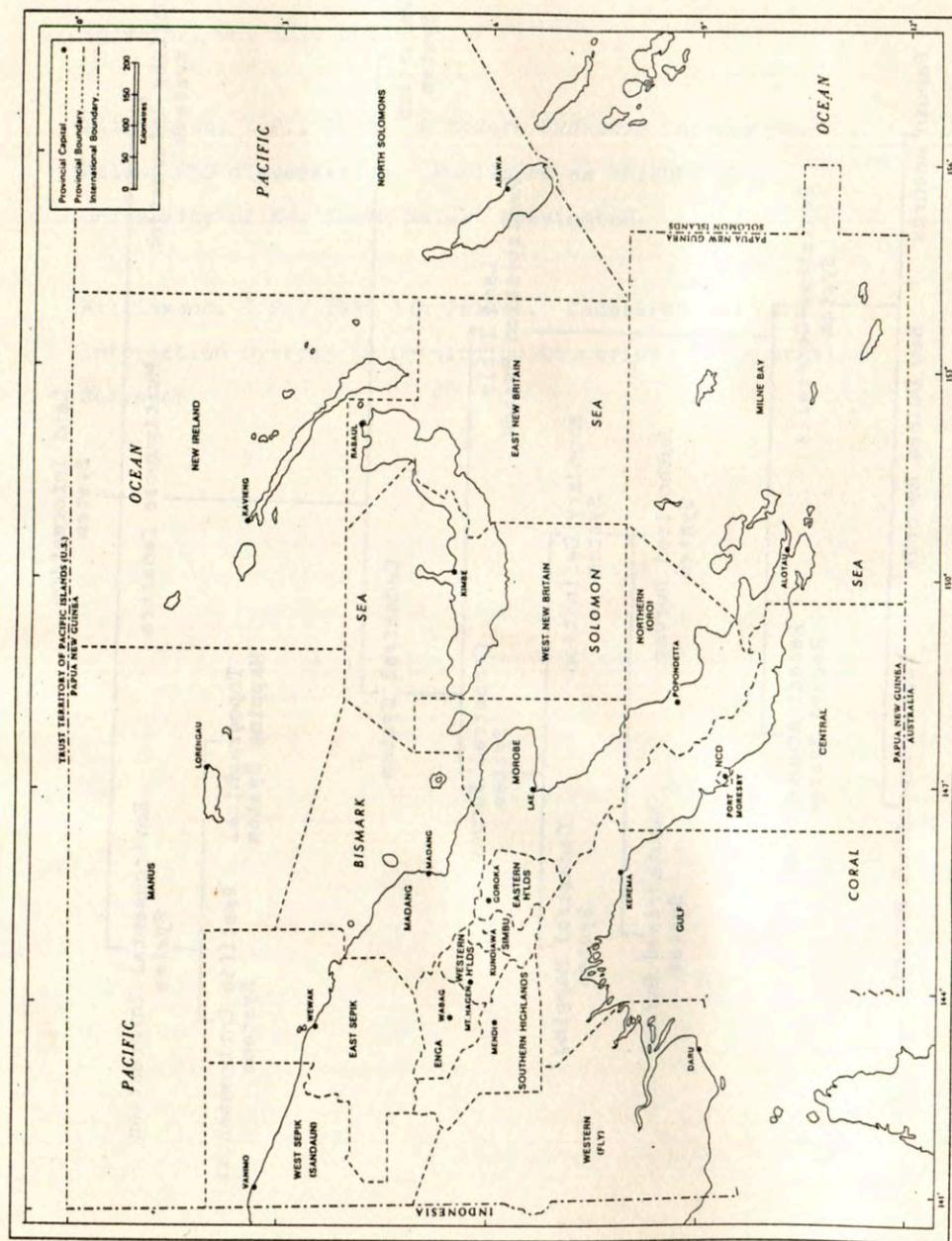


Figure 1. Map of Papua New Guinea (King & Ranck 1982, p19)

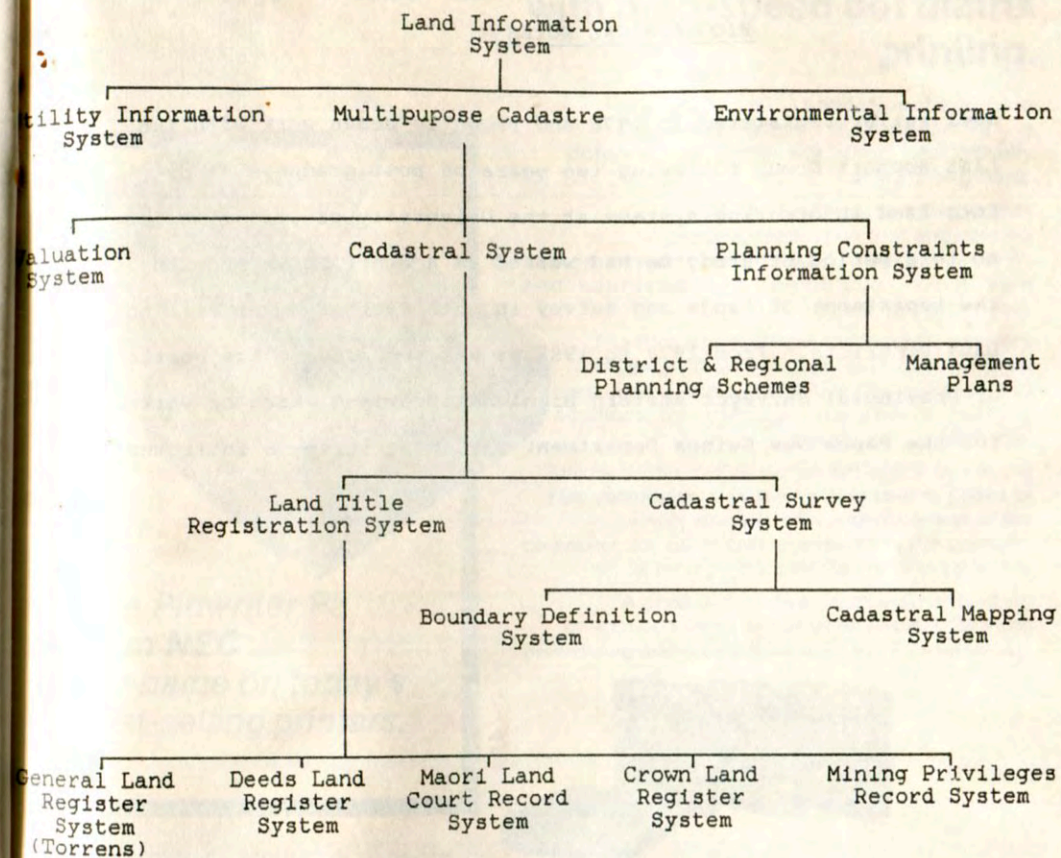


Figure 2. Taxonomy of the Land Information System in New Zealand modified from (Jones & Pullar 1984, p40)

BIOGRAPHICAL NOTES

Neil Pullar registered in 1978 and recently began work with the LINZ Support Group following two years of post graduate study into land information systems at the University of Otago. Prior to this period of study he had worked as a Staff Surveyor with the Department of Lands and Survey in both Southland and Wellington Land Districts. From 1979 to 1982 he was seconded to the position of Provincial Surveyor Western Highlands Province where he worked for the Papua New Guinea Department of Lands, Survey & Environment.

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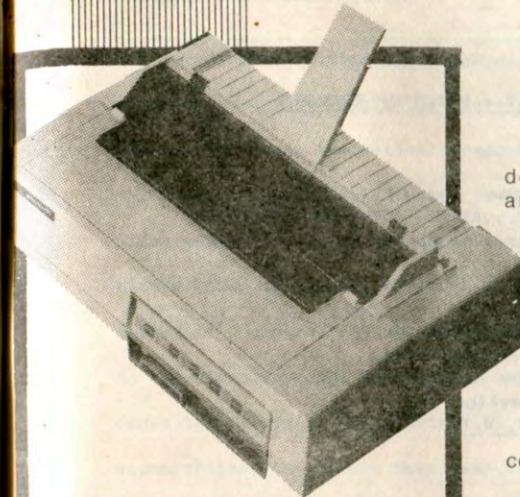
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THE UNSTABLE ENVIRONMENT : RATES OF MOVEMENT

by

P. Done

M.A. M.Sc., C.Eng., F.I. Nuc.E., ARICS, MIS(Aust), MASPNG.

Professor and Head
Department of Land Surveying
University of the West Indies
St. Augustine
TRINIDAD, W.I.

SUMMARY

NASA/JPL are mounting a programme of Geodynamic investigations in the Caribbean. This paper briefly summarises both the tectonic background to this work and the general methodology. It is pointed out that similar techniques would be particularly suitable for geodynamic studies in the Papua New Guinea region, which is similar in its tectonic complexity.

The assistance given by Dr. N.A. Renzetti, Manager, JPL Geodynamics programme is gratefully acknowledged.

GEODYNAMICS: PLATE TECTONICS

Geodynamic studies are concerned with the forces and structural movements occurring within the Earth and with their effect on its outer crust. The basic theoretical framework is that of plate tectonics, which describes the solid outer 70-100 km or so of the Earth - the lithosphere - as being broken up into some 20 comparatively rigid blocks known as plates, as shown in figure 1. The concept of plate motion is a central feature of tectonic theory. Convection currents in the viscous mantle beneath the crust result in driving forces which cause the plates to move, mainly in the horizontal plane. At mid-ocean ridges, the plates move away from one another, and the hot rising mantle material creates newly formed oceanic lithosphere. Where plates collide at oceanic margins, in so called convergence zones, the dense oceanic crust of one plate may be "subducted" into the mantle, whilst the continental crust remains at the surface.

Although the motions are slow, the effects are very impressive. Steep mountain ranges, great earthquakes and significant volcanic activity tend to be associated with convergence zones, or plate boundaries where the plates are moving laterally with respect to each other - for example, as at the notorious San Andreas fault in California.

Estimates of the rates of such movement have historically been based on averages over long periods of time, essentially provided by major changes, occurring over hundreds or thousands of years, in

geomagnetic patterns and anomalies. At present, comparatively little is known of variations in plate velocity over shorter periods. In many cases movements may be, for example, periodic, or episodic; tidal characteristics may also be exhibited. Velocities vary regionally and indeed locally relative movements of up to 1 cm are believed to occur but they are usually not greater than 10 cm a year. Obviously geodynamic studies of such plate movements could be expected to lead to a greater understanding of linked phenomena such as earthquakes and volcanoes and, it may be hoped, to an enhanced prediction capability; the Mexican and Colombian tragedies of 1985 emphasise the desirability and importance of reliable forecasting techniques.

Australia - the "lucky country" - is in a fortunate tectonic situation. The massive Indo-Australian plate dominates the region and it is no coincidence that the seismicity of Australia is small in global terms. (In spite of the short historical record there is evidence of two zones of earthquake risk - South Western Australia and the Adelaide seismic zone extending north into the Simpson desert. Minor seismicity also occurs in NSW and across Bass Strait into Tasmania). However, it is at the margins of the continental plate that the major tectonic action is concentrated: Indonesia, Irian Jaya, Papua New Guinea and New Zealand testify to the instability, or meta stability, of boundary regions.

The Caribbean area mirrors this effect. Situated between the two principal plates of North and South America, it is an area

complicated by a variety of plate interactions.

TERRESTRIAL MEASUREMENTS USING SPACE AND SATELLITE TECHNIQUES

The rationale behind tectonic monitoring is not the establishment of absolute coordinates but rather the detection of the small changes in relative position. For this purpose, the modern geodetic techniques based on relative rather than absolute positioning are particularly well suited provided that adequate precision is attainable.

Geodetic baselines can now be measured to unprecedented precisions - to a few centimetres over several hundred kilometres - using two different techniques, Very Long Baseline Interferometry (VLBI) and Satellite Laser Ranging (SLR) [1,2,3,4]. However, these two methods, despite the development of somewhat more mobile units, cannot at present provide the basis for an economical measuring programme designed to provide observations suitable for plate tectonic or geodynamic studies. Such observations should be dense both in terms of both topographic and temporal distribution. The availability of much more readily transportable, highly precise receivers based on the Global Positioning System (GPS) has therefore transformed the position as regards the monitoring of tectonic plate movements; it is now becoming possible to make the necessarily large number of observations relatively conveniently and expeditiously [5].

At present the GPS system is at the development and evaluation

stage. Full deployment of the 18-satellite constellation is expected by the end of this decade and all indications are that, although designed and operated primarily as a navigational aid, it will be capable of yielding highly accurate positional accuracies for geodetic purposes. Two major sources of systematic error in baseline measurement using this system are known to be uncertainties in the ephemerides of the GPS satellite orbits and the effects of tropospheric water vapour on signal travel times. Assessment of these separate effects is critically important; the NASA/JPL Geodynamics Program [5,6,7] is concentrating on this aspect in its initial stages, with the aim of reducing the present strong dependence of baseline errors on baseline length. The aim in 1985 is to achieve subdecimeter performance three-dimensionally over distances up to 400 km. Subsequently, it is envisaged that vector accuracies at the 1-3 cm level should be attainable by 1989.

Available GPS instrumentation to be evaluated and compared consists of SERIES-X, MACROMETER and the TI4100 receiver. It is intended to assess relative performance and field operability in conjunction with WVR improvements over a two year period, and to select the most appropriate receiver system for full Caribbean deployment in 1987.

REDUCTION OF SYSTEMATIC ERROR

Reduction of orbital uncertainties is based upon the concept of a "super" control, or "fiducial" VLBI network. This consists of

the POLARIS stations of the National Geodetic Survey (NGS) which are resurveyed periodically by VLBI (Figure 2). GPS orbit uncertainties are reduced by carrying out simultaneous GPS observations at the known (fiducial) points (Figure 3). It is realised that for Caribbean use in particular the usefulness of the NGS network for fiducial purposes would be considerably enhanced by provision of a further station in S. America [8], enabling the network physically to cover the area of interest, rather than a reliance having to be placed on extended extrapolation.

The water vapour effect can be corrected for by use of data from water vapour radiometers (WVRs); these are used to derive the additional sky brightness along the quasar line of sight due to microwave emission from free water molecules, and are reduced by algorithm [9]. New designs of WVR are expected to be so effective as to ensure that this error is no longer dominant in the overall budget.

OBSERVATION STRATEGIES

Measurements connected with investigations of inter-plate and intra-plate kinematics should be capable of resolving movements of the order of 1 cm/year [6]. The measurement frequency would depend on instrumental accuracy and the nature of the tectonic regime in the area concerned: it is considered that a measurement interval of two to four months should normally suffice. Site selection is obviously important; for inter-plate movement studies this involves the

unconditional positioning of the two ends of baseline on separate plates. This may not always be straightforward in any region in which boundaries are somewhat ill-determined or diffuse. In general, station establishment procedure is based on a philosophy somewhat different from that in traditional land surveying: an ideal site for tectonic GPS measurements should have low topographic relief and no visible evidence, or known history of, recent volcanic or tectonic activity. Relatively flat areas of geologically old, sedimentary rocks are particularly desirable.

Inter-plate observation is the main type of geodynamic investigation, but it may be noted that there are others aimed at quantification of post-seismic movements and seafloor spreading.

Post-seismic movements made after earthquakes are most valuable if instrument deployment can be effected within a day or two of the event. The frequency of such measurements should then be of the order of hours.

A third type of procedure is necessitated by seafloor spreading activity. This phenomenon characteristically takes place in areas some distance from continental land masses or islands. A seabed geodetic capability is required in this context, with the concomitant harnessing of marine acoustic positioning techniques.

MODERN INVESTIGATIONS

As indicated above, the Caribbean area is tectonically very complex: Figure 4 shows a map in which the figures are average velocities. It is believed that rates of plate motion are not particularly high, but the five plates in the general area interact in a variety of ways; subduction, convergence, lateral movement and spreading all occur. Obviously, most plate boundaries are located beneath the sea and island sites take on added significance. The geographical size and compactness of the region is such that a relatively small number of GPS observation stations can yield significant data relevant to the study of crustal deformation, convergence, and general mantle rheology.

Over the next two or three years, a large number of baselines (indicated provisionally in figure 5) are to be measured so as to measure regional deformations:

- (a) studies of the northern Caribbean plate boundary. Here the baselines are relatively short:
- (b) observation of relatively long baselines across the major plate boundaries;
- (c) baselines from Central America and Providencia and San Andreas to Cocos Island.

There is no doubt that Australia, as a platform from which relative measurements may be made, is very well equipped to pursue

investigations of a similar nature, for example, in Papua New Guinea. A well established 'fiducial' network of VLBI stations is in existence [10,11] and this could be used to advantage, particularly if it were to be extended to the north. (The interested reader is referred to [3] and [4]; these give a much more comprehensive and authoritative overview of the Australian position than has been possible in this short article).

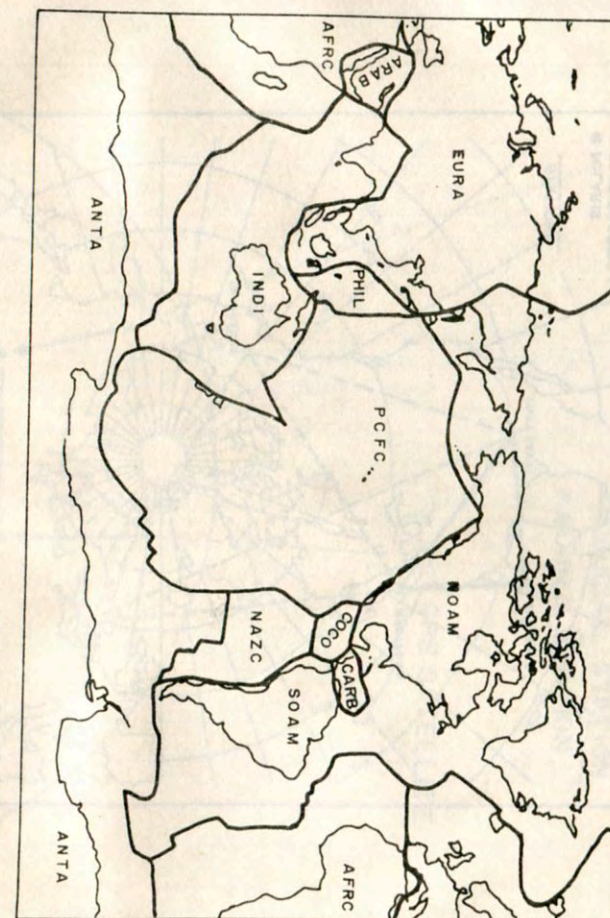
As regards Papua New Guinea, the tectonic picture matches or even exceeds the complexity of that in the Caribbean. Like the Caribbean, the area is one between massive plates, here the continental Indo-Australia and the Pacific. Figure 6 shows that in the region there are some six plates and eleven boundaries. A fifteen station network established in 1981 [12] and shown in figure 7 was observed by TRANSIT Doppler, using short-arc methods of adjustment, capable of precisions only of $1:10^6$ - marginal for this type of work. It was realised however, that the expected availability of newer GPS instrumentation [12,13] could lead to significant improvements. Such is the rapidity of technological advance that this new instrumentation is now available.

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Fig. 1 MAJOR TECTONIC PLATES.



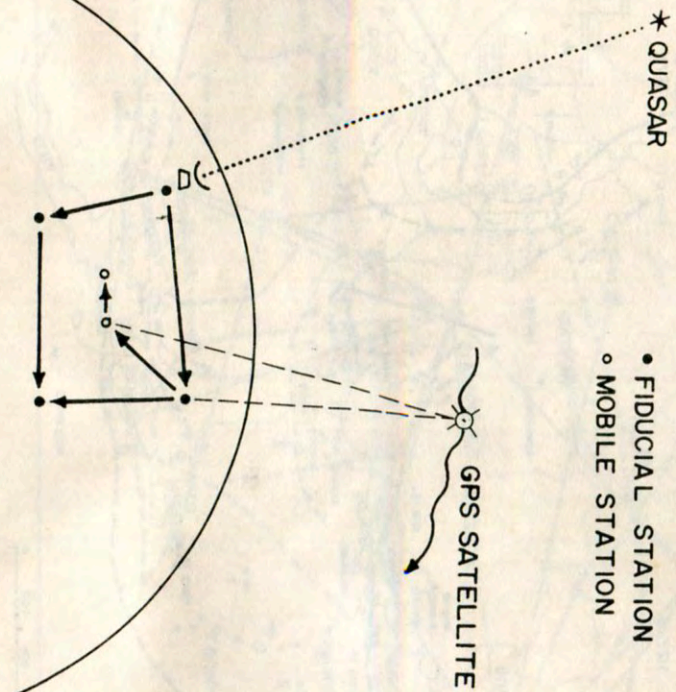


Figure 3. THE 'FIDUCIAL' CONCEPT.

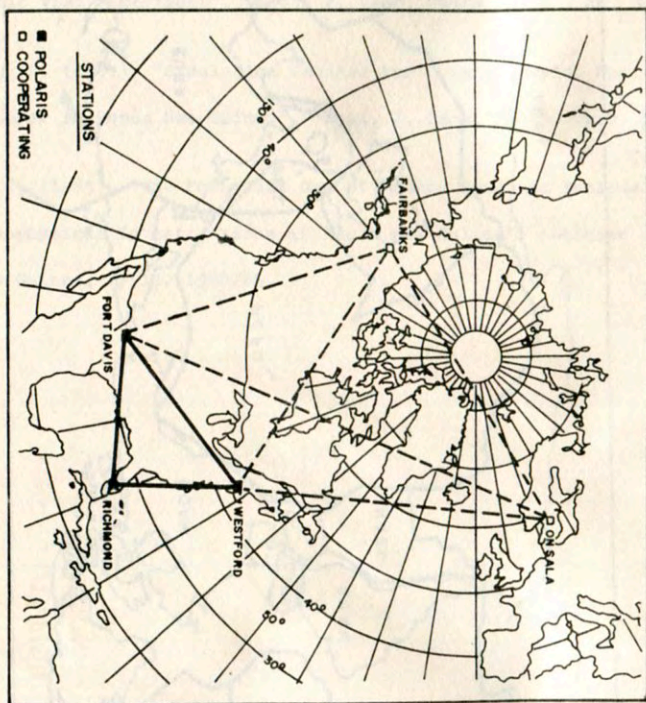


Figure 2. "POLARIS" V.L.B.I. STATIONS

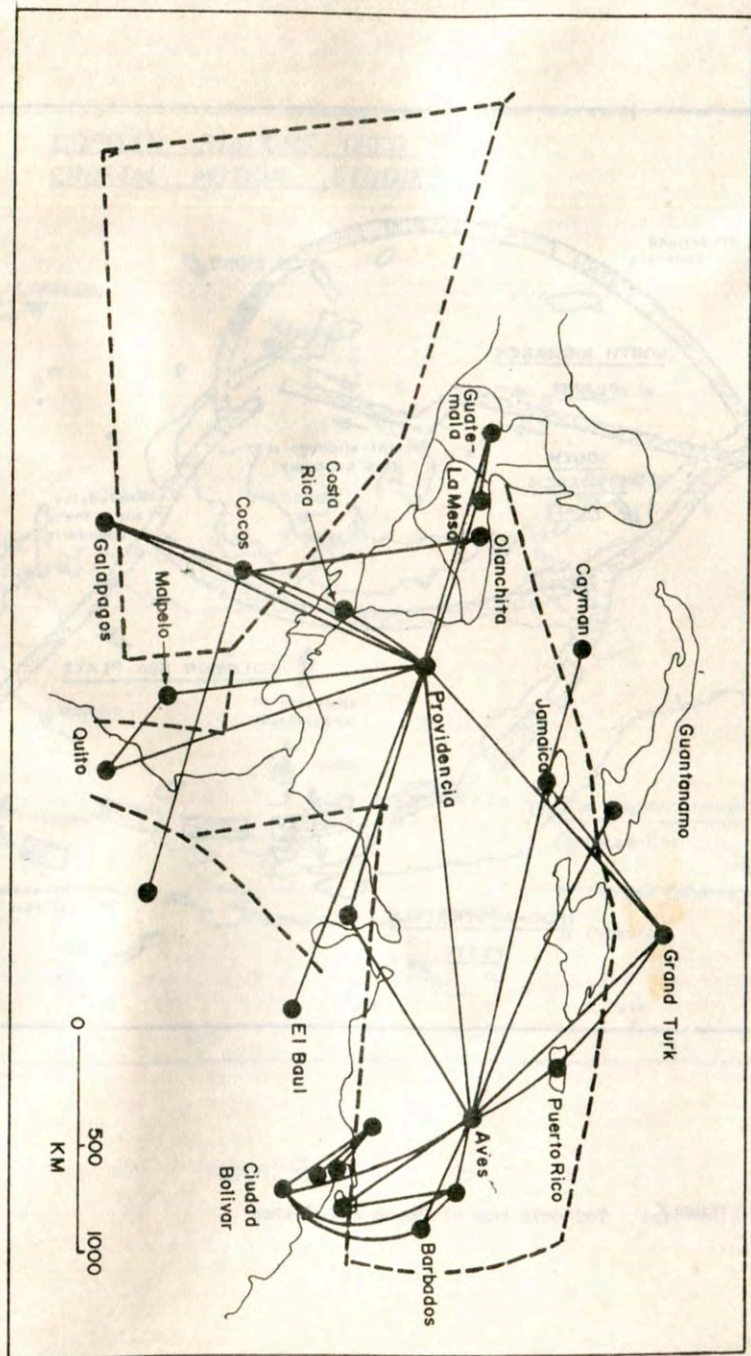


Figure 5 PROPOSED MAJOR CARIBBEAN BASELINES.

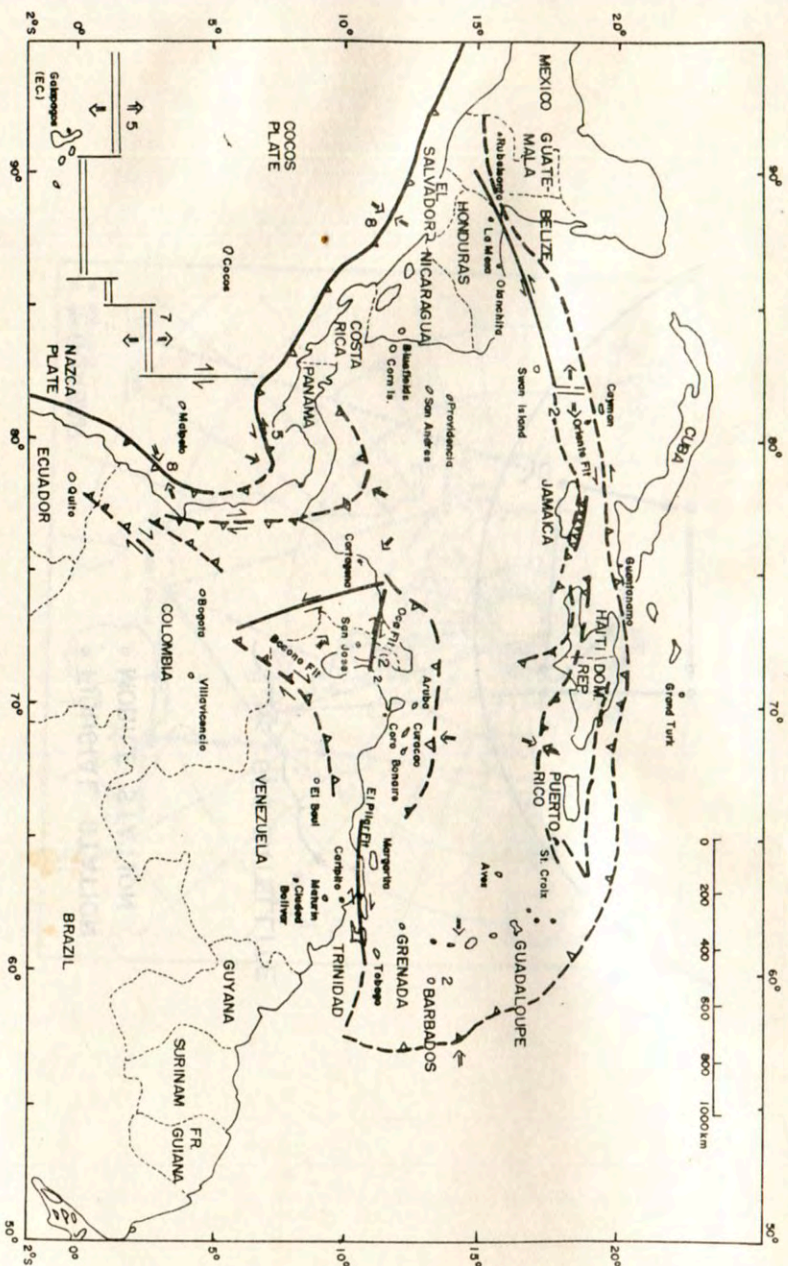


Figure 4. TECTONIC MAP OF THE CARIBBEAN REGION
(Figures are average velocities in cm/year.)

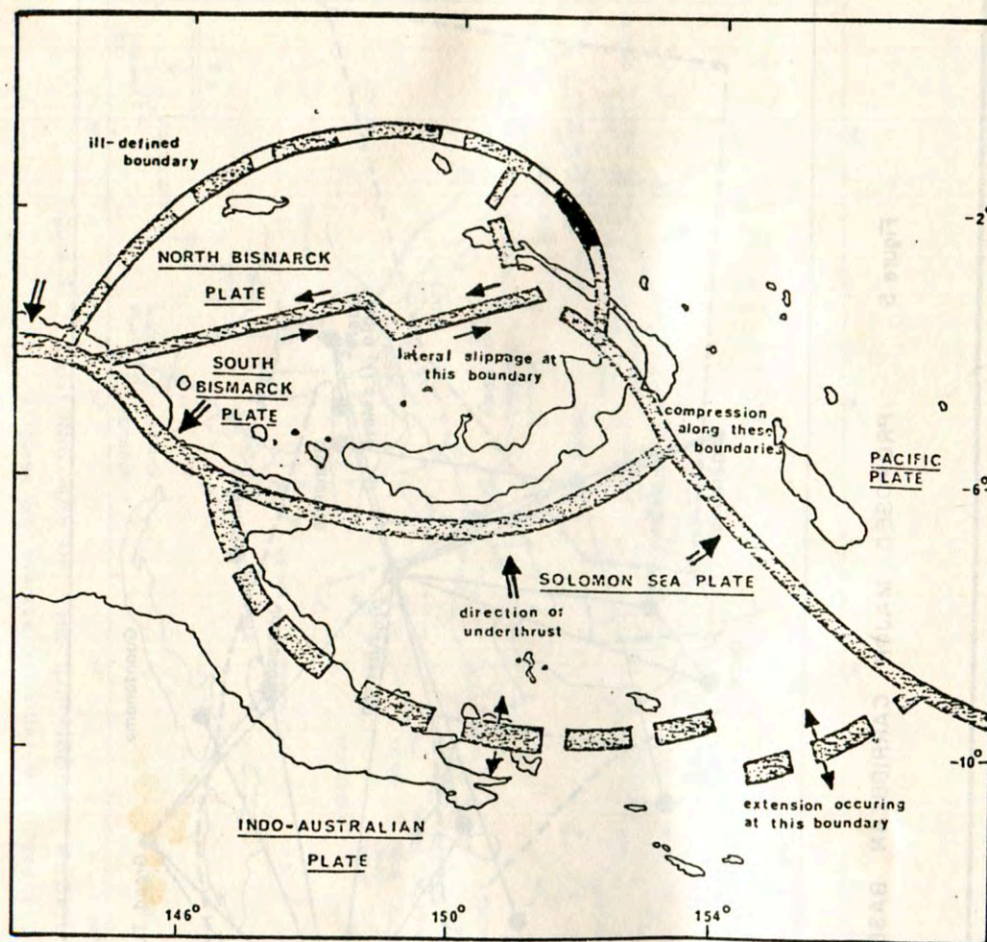


FIGURE 6: Tectonic map of Papua New Guinea

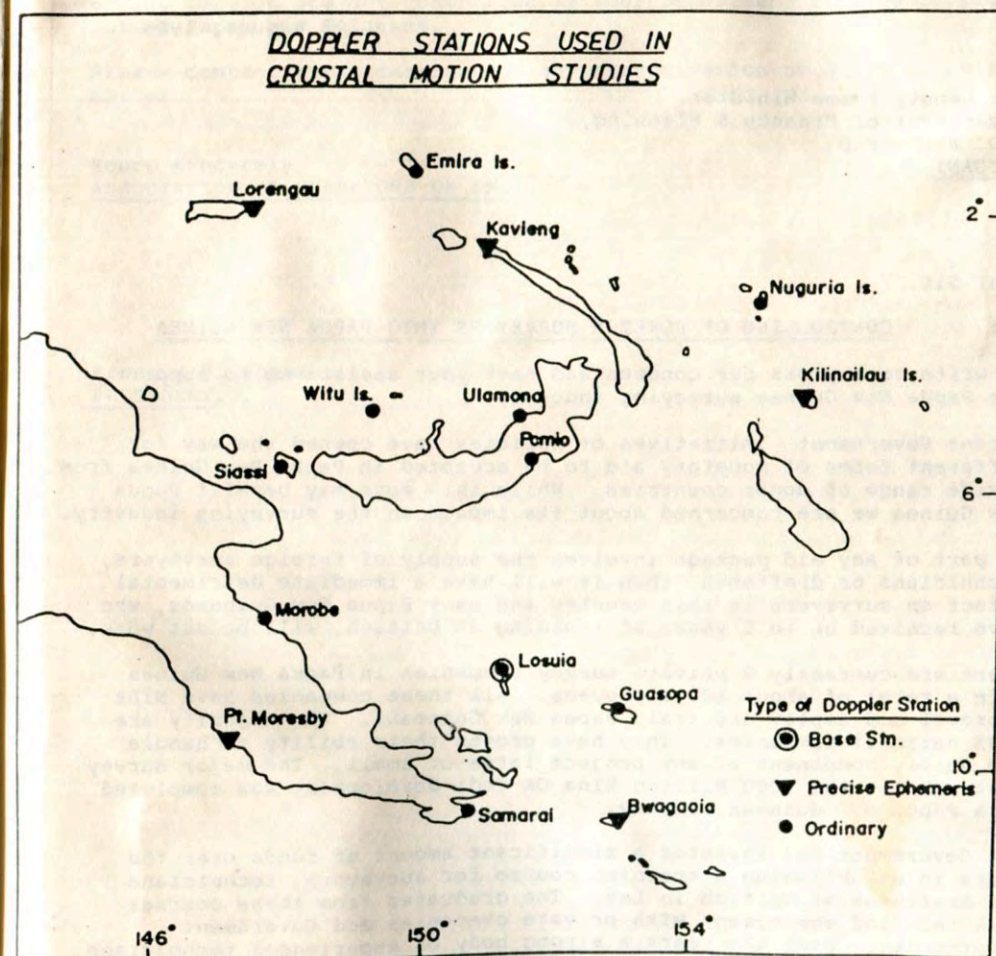


FIGURE 7

The Association of Surveyors
of
Papua New Guinea

28 August, 1986

The Deputy Prime Minister,
Department of Finance & Planning,
P.O. Wardstrip
WAIGANI.

Dear Sir,

RE: CONTROLLING OF FOREIGN SURVEYORS INTO PAPUA NEW GUINEA

We write to express our concern and seek your assistance to support the Papua New Guinea surveying industry.

Recent Government initiatives or policies have opened the way for different forms of monetary aid to be accepted in Papua New Guinea from a wide range of donor countries. While this move may benefit Papua New Guinea we are concerned about its impact on the surveying industry.

If part of any aid package involves the supply of foreign surveyors, technicians or draftsmen, then it will have a immediate detrimental effect on surveyors in this country and many Papua New Guineans, who have received up to 5 years of training at Unitech, will be out work.

There are currently 9 private survey companies in Papua New Guinea with a total of about 100 employees. All these companies have NIDA approval and employ and train Papua New Guineans. The majority are 100% national companies. They have proven their ability to handle the survey component of any project large or small. The major survey contract for the 1000 Million Kina OK Tedi development was completed by a Papua New Guinean company.

The Government has invested a significant amount of funds over the years in establishing a training course for surveyors, technicians and draftsmen at Unitech in Lae. The graduates from these courses seek and find employment with private companies and Government Departments. Over the years a strong body of experienced technicians and surveyors of a high professional standing has been establish.

The years of training and gaining technical experience and expertise can be jeopardised if through foreign tied-aid projects, foreign surveyors are allowed to enter this country and carry out work that could easily be done by Papua New Guineans.

We seek your assistance and assurance that the survey component of any foreign project controlled by your Department will be carried out by Papua New Guineans.

Please contact the undersign for any clarification or query on this matter.

Yours sincerely,
ASSOCIATION OF SURVEYORS OF PNG.

Francis P. Posanau
PRESIDENT.

The Association of Surveyor
of
Papua New Guinea

29 August 1986

Senator Susan Ryan,
C/- Australian High Commission,
P.O. Box 9129,
HOHOLA.

Dear Senator S. Ryan,

I read in the paper that you are now visiting the country to examine some ways in which Australia could provide some assistance to our education here.

I am, by way of introduction, the current President of the Association of Surveyors of PNG. Our membership comprises of about 40% nationals and 60% expatriate surveyors. Out of about this 60% expatriate surveyors, 50% of them are now working in Australia, but still retain their membership.

For the last couple of years, we have been experiencing quite a number of problems within our profession. The first problem is that we have quite a number of our graduate surveyors unemployed at the moment, the number is around 20. The government departments cannot recruit them because of the staff ceiling or quota system, and the private survey firms cannot absorb them at the moment because there isn't much survey work around. (We have about 8 private survey firms, however about 70% are one or two (surveyor) man units.

We have written to various Government Departments and Statutory Authorities on this, but response has been virtually nil. My council is still investigating some ways in which we can improve on this unemployment situation, however because of the political situation at the moment (new election coming up), initiatives we have taken may not been considered for sometime by the Government.

Last month I attended the 28th Australian Survey Congress in Adelaide and on my way through Sydney, I managed to hold discussion with the executive of the Surveying Department at the University of NSW. It was chaired by Prof. G.G. Bennett. From the discussion Prof. Bennett indicated the Department could provide one or two places for our graduates to do Post Graduate Studies, however, the problem is finance.

We, (Association of Surveyors of PNG) feel that we need to raise the education standard or level of some of our graduates in order that they could take up lecturship at the local University of Technology in Lae or become research people or take up higher responsible positions in government and private industry. (We have only one national surveyor who is a tutor at the Lae University).

Could you consider, or Australian Government consider, providing financial assistance for two or so of our outstanding graduates to study at the University of NSW or Queensland. Areas we have been discussing would be;

1. Master degree in survey science
2. G.P.S research
3. Land Information system
4. Photogrametry etc.

At the moment there are Chinese, Indonesian and Singapore students studying some of the above fields in the Department and Prof. Bennett indicated our graduates could be considered as well.

I would appreciate if you could consider our request and take this up to the right Minister or people in your Government or in Australia. I apologise for not going through the right channel. However seeing you were visiting the country, I thought I might drop you our request.

Kind regards

Yours faithfully,
ASSOCIATION OF SURVEYORS OF PNG

Francis P. Posanau
PRESIDENT

P/S The Queensland University Centre, I understand, will start a new course on registration of surveyors next year. Could you also consider providing financial assistance here, so that we can send say one or two graduates there. Because of depature of Australian Surveyors, we have problem supervising our graduates to obtain their licence.

IN MEMORIAM

ALLAN BALE

Allan Bale passed away in tragic circumstances in Rabaul of 7 September 1985. Allan, a Tolai, was from Raluana Village on the Gazelle Peninsula of East New Britain.

Allan was the first National President of the Association of Surveyors of Papua New Guinea in 1976. He graduated from the University in Lae in 1969 and was employed by the Dept of Lands where he was being groomed to become Surveyor General. He was the first Papua New Guinean to obtain registration in November 1971 and decided to go into the Private Sector where he at various times was a Partner in the firms of Fitzhenry & Associates, Bale & Symmons and Arman Larmer Surveys before returning to Rabaul and setting up on his own practice a few years before his death. Allan was fine example to all young PNG Surveyors.

Allan is survived by his wife Eileen and his two sons Kenneth and Kila.

TOM JACKSON

Tom Jackson passed away in Sydney on 7th January 1986. Tom was a Foundation Member of the ASPNG and came to Papua New Guinea in 1958 as a Staff Surveyor with the Dept of Lands. He was a very active member of the Association and served two terms as President from 1967 to 1969. Tom became the Principal Surveyor of the Papuan Region in 1968 and held that position until he left the country in 1975.

From May 1980 until his death Tom was the Executive Officer of the Institution of Surveyors N.S.W. Inc. Tom last visited Port Moresby in July 1984 when he attended the Nineteenth Survey Congress.

Tom is survived by his wife Miriam, Sons Brian, Alan & Ian, Daughter Vicki & stepsons Graham & Murray Sturgess.

KEN BLAIK

Ken Blaik passed away in Canberra on 19 May 1986.

Ken spent almost a total of 20 years in Papua New Guinea between the early sixties & the early 80's.

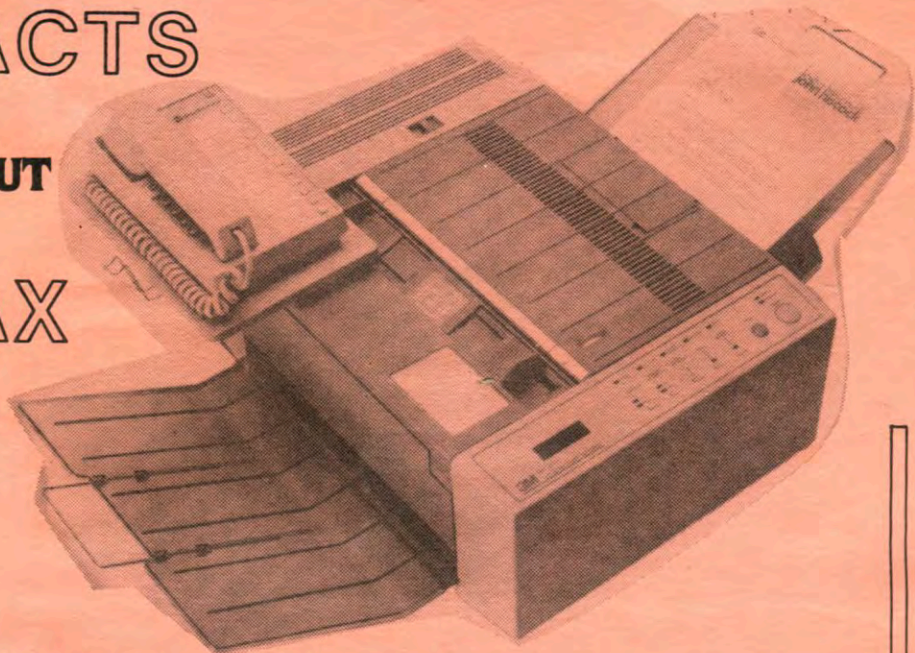
He worked for more than ten years with Lands Dept primarily in the Highlands before going finish in the early 1970's. He returned in about 1979 to work with the Dept of Works and went finish again in mid 1982.

Ken is survived by wife Jenny, two sons Malcolm & Stephen & daughter Sandra.

FACTS

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