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Thailand Land Titling Project

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Executive Summary

The Thailand Land Titling Project is an outstanding success story of inter-agency cooperation and received the World Bank Award for Excellence in 1997. It was designed as a four-phase project over 20 years and will finish in 2004. The project partners—the Royal Thai Government, the Bank, and the government of Australia—provided funds and personnel, with the Australian Agency for International Development (AusAID) supplying technical assistance and training programs to the Department of Lands (Thailand). The project goal was to strengthen the institutional capacity of the Department of Lands by providing training and expertise in cadastral surveying and mapping, title deeds issuance, land valuation, and information technology. At completion, it will have delivered approximately 13 million titles to Thai landowners and will continue to deliver significant social, financial, and economic benefits to Thailand for years to come.

Reviews of the project have noted the effectiveness of land titling projects in addressing rural poverty, increasing tenure security, and improving access to credit by titleholders. These achievements have had positive effects on regional economic growth, greater social stability, and sustainable resource management. The project’s development of good practice guidelines will enable future projects to be managed with an additional degree of effectiveness. In addition, its strong focus on governance and capacity building has assisted in ensuring sustainable outcomes for the Thai government.

When the Thai Land Titling Project (TLTP) began, local consultants conducted a Land Policy and Development Study to support preparation of the Fifth Five-Year National Social and Economic Development Plan (1981−85). The Study found that 46 percent of Thailand’s land area was devoted to agriculture. However, only 12 percent of the agricultural area was covered by title deeds; 49 percent was held under less secure forms of officially recognized land-use-right documents, 18 percent was occupied by people who lacked officially recognized documentation, and a further 21 percent was illegally occupied forest reserve. The Royal Thai government, in consultation with the Bank, decided that land tenure was a significant issue in rural development, and in 1984 the Australian government approved the TLTP implementation.

The TLTP was designed to develop the capacity of the Department of Lands. The first project implementation phase began in nine provinces in north and northeastern Thailand (the provinces of Chiang Mai, Chiang Rai, Phayao, Lamphun, Mae Hong Son, Nakhonratchasima, Buriram, Sisaket, and Surin). These provinces had been identified as containing widespread poverty and were primarily agricultural areas. The second and third phases were completed in the north, northeast, east, and central parts of Thailand. The southern section, which contains the added complication for surveyors of having a heavy covering of rubber trees, will be completed during the final project phase ending in 2004.

The project has had four central objectives:

- To accelerate the issuance of title deeds to eligible landholders throughout Thailand
To produce cadastral maps in rural and urban areas, using a uniform mapping system showing all land parcels

To improve the effectiveness of land administration at both central and provincial levels

To strengthen the Central Valuation Authority to provide an effective property valuation service at the national level.

The Thai Land Titling Project’s success has meant that a considerable amount of project reviews and assessments have been carried out, in addition to the normal project evaluation process. The 2000 AusAID review of land titling projects, entitled *Improving access to land and enhancing the security of land rights: A review of land titling and land administration projects*, examined factors contributing to the project’s success in detail and drew a number of lessons learned that could be applied to future land titling projects. In addition, a major corporate project participant, BHP, produced a paper entitled *10 Pillars of Land Titling*, on a successful land project’s components. These ten pillars were identified as:

1. *Land titling is a means to an end, not an end in itself.* Land titling must be continually demonstrated to support fundamental quality of life issues confronting developing nations. If not, government commitment will waver and the community’s participation and confidence will be difficult to achieve.

2. *Land titling needs a commitment to national reform.* A commitment to change at the highest levels is required. Clear and consistent policy and a legal framework are important to accomplish the technical, equity, social justice, and good governance project outcomes.

3. *Land titling is about people, not technology.* The initial emphasis must be on process improvement and the expansion of the bureaucratic skill base, with a particular emphasis on developing future leaders.

4. *Land titling is more than a project—it is a way of life.* Land titling is a long-term program aimed at bringing about reform to the national land administration system. To be successful, people in institutions need to change.

5. *Technology provides the tools, not the standards.* Land administration is strongly influenced by the bureaucratic, social, and cultural environment, and overlooking existing practice often leads to failure. It is important to review existing manual procedures and to then simplify and streamline where appropriate.

6. *Successful land titling requires community support.* The land titling process should be public, open to all, and actively involve village officials. Fees must be transparent and the adjudication results publicly displayed.

7. *Get the results on the board quickly.* Policymakers will be assured that land titling is viable if early key results can be demonstrated.
• **Work from the part to the whole in developing land law.** It can take considerable time to develop and implement high-level land law. Lower-level legal instruments such as ministerial decrees are often useful.

• **Land titling requires production orientation.** Land titling is a production process that requires a series of coordinated actions. A key element is the setting of output targets, and it is important that there be quality control and monitoring.

• **Ensure an appropriate reward for field staff.** Land titling personnel can spend long periods over many years in the field. If field staff are not adequately rewarded, there will be repercussions, either in the quantity or quality of their work or in the manner in which they seek to establish an informal reward system.

Further, some of the key lessons highlighted by various project assessments are these: Project initiators should ensure that project rationale and objectives are directed to well articulated and defined development problems; outputs should be realistic and achievable, and the technical methods and systems introduced culturally acceptable, affordable, and sustainable. There should be a high likelihood that benefits will continue to be achieved long after the project has ceased. Project initiators should ensure that the design time is adequate to allow the recipient country staff to contribute, to understand the proposed outcomes, and to feel they own the project design. The social and gender aspects of land titling should be given more importance in design and implementation to avoid potential adverse impacts on particular socioeconomic groups and to ensure that the target groups are beneficiaries. It is essential to effectively monitor social and gender aspects throughout the life of the project and preferably beyond. Quality baseline studies for social and economic evaluation are needed. It is useful to closely monitor the progress and validity of assumptions, sustainability indicators, and achievement of benefits. The design team should include expertise in development, social, and gender issues and in technical aspects.

Some more specific recommendations are as follows:

• For advisers, cultural and language barriers are not quickly overcome; long-term advisers working closely with well-selected counterparts can minimize these problems.

• Advisers must transition effectively from the analysis and recommendation phase to overseeing and guiding the change process, when appropriate.

• Systematic land adjudication is the most effective approach to accelerated land titling under Thai conditions. Land titling targets under this approach must consider constraints such as unclear boundaries with forestry, land reform areas, and lack of clear ownership evidence. A realistic target was an 80 percent titling rate of parcels identified by the adjudication teams.

• Sustainable institutional change requires a long-term framework and sustained efforts, often beyond a project’s time horizon.

• Land titling and land reform efforts need to be grounded in an overall rural development strategy that weighs the relative cost and likely impacts of various alternatives for reducing rural poverty and improving natural resource management.
• Clear policy direction is needed to bridge the gap between technical change and longer-term institutional development.

• Factors essential to project success include strong management, particularly in the planning and implementation of systematic adjudication and land titling, continuous technical assistance by a resident team of advisers, and flexibility in project implementation, as was demonstrated under TLTP by the readiness to shift resources toward more ground surveys to achieve appraisal titling targets.

• Change will occur more readily while the advocate is present to follow up on recommendations.

• Targets should be established in terms of area covered, not number of titles issued. A focus on area targets will provide titling agencies with an incentive to clarify boundaries between private and state domain and give a clearer sense of the gaps left by a first sweep of systematic adjudication. In the absence of data on the size of these gaps, it will be difficult for the government to make an informed decision about whether to conduct a second sweep or simply to leave the areas uncovered to sporadic adjudication.

• Farmers in the Land Reform Areas should be provided with efficient land surveying services and defined and marked forest boundaries to enable the titling of contiguous lands. Land information data should be shared more effectively among government agencies. All these undertakings are best programmed and implemented within a common policy and institutional framework for land management and administration. Such a framework would enhance the coordination of policies and programs undertaken by the various agencies responsible for land reform, land titling and registration, forestry and land conservation, property valuation, and property tax assessment.

• The case for freeing up land in state hands should be carefully considered. The return to deregulation, if accompanied by appropriate policing of core reserve areas, is likely to generate larger social benefits than titling areas already in the private domain, where land rights are not a source of conspicuous conflict. In Thailand, areas in the private domain offered relatively secure tenure to farmers before the titling program. However, a large number of farmers occupy reserve land that, in many cases, is appropriate for farming; this land does not offer critical environmental services and it is beyond the means of the government to protect it. Farmers on encroached reserve land are deprived of the benefits—principally, improved access to formal credit—extended by the titling program.


Implementation Process

AusAID has supported, and continues to support, projects that are concerned with land titling, land administration, surveying and mapping in a number of countries, most particularly in South East Asia and the South Pacific. There have been about 50 AusAID land projects in the last 15 years, and the large projects have involved and continue to involve co-financing with the World Bank. These projects are costly to run, and can be complex, but effective land titling has numerous direct benefits to the poor and ultimately contributes to economic growth.

At the commencement of the Thai Land Titling project (TLTP), a Land Policy and Development Study was undertaken by local consultants in support of the preparation of the fifth Five-Year National Social and Economic Development Plan (1981 – 1985). It found that 46% of Thailand’s land area was devoted to agriculture, but only 12% of this was covered by title deeds. A further 49% was held under less secure forms of officially recognized land use right documents, while an additional 18% was occupied by persons who lacked officially recognized documentation, and a further 21% was illegally occupied forest reserve. The Royal Thai Government, in consultation with the World Bank, decided that land tenure was a significant issue in the promotion of rural development, and in 1984 the Australian Government approved the implementation of the TLTP.

The TLTP was designed to develop the capacity of the Department of Lands in cadastral survey and mapping, title deeds issuance, land valuation and information technology in order to improve land management practices in the Department of Lands. The project was divided into four five-year phases, commencing in 1984 and concluding in 2004.

The first phase of project implementation commenced in 9 provinces in the north and north-east of Thailand (Chiang Mai, Chiang Rai, Phayao, Lamphun, Mae Hong Son, Nakhonratchasima, Buriram, Sisaket and Surin). These provinces had been identified as containing widespread poverty and were primarily agricultural areas. The second and third phases completed the area in the north, north-east, east and central part of Thailand. The southern part, which contains the added complication for surveyors of having a heavy covering of rubber trees, will be completed during the final phase ending in 2004.

The project had four central objectives:

- To accelerate the issuance of title deeds to eligible landholders throughout Thailand
- To produce cadastral maps in rural and urban areas in a uniform mapping system showing all land parcels
- To improve the effectiveness of land administration at both central and provincial levels
- To strengthen the Central Valuation Authority to provide and effective property valuation service at a national level
A Project Executive Committee was established, chaired by the Deputy Permanent Secretary to the Ministry of Interior (Thailand), with the responsibility to formulate and supervise project administrative policy. Additionally, the Project Administrative Committee, chaired by the Director of Department of Lands (also the Project Manager, Thailand) was assigned to supervise and monitor the project implementation.

The project aimed to enhance security in land tenure so that landholders would be confident to invest and develop their land to increase their income. The provision of recognized legal title to land gave them the ability to obtain more favourable credit from lending institutions and decreased the distortion in land prices that had previously existed, as well as minimizing the likelihood of land disputes. Additionally, improved land valuation techniques allow the accurate collection of fees and taxes, thereby increasing the revenues accruing to the Department of Lands.

The Australian Government supplied grant funding for an international education and training program for Department of Lands staff and other agencies concerned, consisting of a variety of tertiary study scholarships. The project was supported further by the presence of 46 long-term advisors (>6 months) and 31 short-term advisers (<6 months).

Subsequent reviews have noted the effectiveness of this and other land titling projects in targeting rural poverty and increasing the security of landholders who might otherwise be at risk of being removed from their land. Land titling projects should be effective and affordable, both to landholders and the government, and should comply with good governance norms. The Thai Land Titling Project forms part of AusAIDs long-term policy of supporting land titling initiatives throughout its region of operation.

**Impact Analysis**

Land titling has been shown to provide a variety of benefits, both economic and social. Land titling enhances tenure security, increases access to credit, and thereby improves farm income and land values. This generates benefits both to the individual land holder and the community and economy as a whole. In the AusAID Review of Land Titling and Land Administration Projects (2000), a number of methods were used to qualitatively and quantitatively assess the outcomes of the TLTP. The review found that

- Farmers who have legal title to their land felt more secure in holding the land and were more likely to invest money, time and effort in developing their land
- People obtained more favorable credit from lending institutions when they possessed recognized legal title to land
- Farmers with titled land switched cropping systems to fruit crops, which increased yield, net income and land value

  Additionally, the following social impacts were observed:

- People with legal title to their land were gaining equitable access to credit by using their land as collateral
THAILAND LAND TITLING PROJECT

• Poverty in rural areas with land title was reduced
• Improved efficiency and equality of taxation
• The reduction in land disputes strengthened communities

These outcomes benefit both individuals and community, are pro-poor, and successfully contributed to AusAID’s overall objective of “poverty reduction through sustainable development”.

Driving Factors

Land tenure issues can be highly sensitive, and must be addressed with the partner country with recognition of local conditions, cultures and politics. The ability to achieve appropriateness, effectiveness and efficiency, coupled with equity, social justice and good governance, is a major challenge. Worldwide there have been a number of different situations leading to diverse approaches, and mixed results have been achieved. The TLTP is one of the land titling success stories, and contains a number of factors that, in combination, have led to its success.

The Royal Thai Government, in conjunction with the World Bank, identified land tenure issues as vital to the development of the Thai economy and poverty reduction strategies. This high-level support ensured that efforts to reform land tenure were encouraged and promoted throughout the bureaucracy. In addition, when the 1997 crisis meant that budgets were reduced, the Royal Thai Government still devoted time and resources to this project in recognition of its importance to the Thai economy.

A major factor in the successful implementation of this project was the fact that there was only one agency involved (the Thai Department of Lands), and that there was a strong early emphasis on titling in geographic areas where ownership was fairly straightforward. By focusing on areas that could be titled successfully, and with minimal dispute, the project was able to rapidly implement the groundwork and develop capacity to tackle the more complex ownership areas. The early emphasis of the project was on titling and other technical aspects, with institutional aspects included at a later stage. Further assisting the progress of the project was the fact that few major changes in land policy, the legislative base, tenure arrangements, institutional arrangements or land administration were required for technical, equity, social justice or good governance reasons. The fact that existing policy and structure was adequate for the project to proceed was an important contributor to the overall success of the project.

Additionally, human resources were identified as being a vital component of the successful management of the project, and as a result there was a strong focus on education and capacity building within the Thai bureaucracy. The contribution of education, training and human resource development was important in three main areas: improved recognition and assignment of competencies to core areas, strengthened capacity building in core areas, and the implementation of sustainable long-term service provision facilities. Continuity of personnel and companies
between project phases was also recognized as a major contributor to success, particularly between Phase 1 and 2.

**Commitment and Political Economy for Change**

One consistently noted factor in the success of the TLTP was the existence of a policy and legal base that was adequate to accomplish the technical, equity, social justice and good governance outcomes of the project. The absence of customary land tenure types, which significantly contribute to the complexity of a land titling project and have proven to be a hindrance in many projects in the Pacific region, meant that the transition to land title was relatively smooth and a focus on technical aspects was possible. Further, there were no problems that are often found in former Colonial regions, in the allocation of alienated lands. As Thailand has never been subject to colonial rule, the land tenure system was again less complicated than is often the case in Africa and other former colonies. The ongoing support of the Royal Thai Government, and the general support for land title reform in the community, meant that many of the political disruptions often seen in land titling projects were not at play in this project. The support of both government and community groups was a major facilitator in the effective implementation of land reform.

**Institutional Innovation**

An important focus of the TLTP was strengthening and capacity building within the Royal Thai Government to facilitate ongoing sustainability. It is generally recognized that public sector specialist agencies are the most appropriate providers of mapping and surveying services, and so it was important to ensure that capacity was built centrally to enable continuing administration. The process of strengthening national mapping and surveying agencies necessarily involved the introduction of a range of specialized technical equipment and required appropriate staff education to ensure that skilled staff were able to maximize the benefits derived from this technology. Further, the development of land information systems (systems containing core data based on land parcels) requires interdepartmental co-operation on a wide range of policy and technical issues.

At the commencement of the project, the Department of Lands was fortunate to have competent and highly skilled staff distributed in a countrywide network throughout the 73 provinces in Thailand, which enabled the effective implementation of training and technology deployment strategies. Additionally, the project focus on education meant that the skills of these staff were upgraded through scholarship assistance for further tertiary education, and through the provision of technical assistance. Both local and overseas training was provided: local training focused on skills training in information technology, new and computerized methods of market-based valuation, while overseas training focused on adjudication, registration and land information systems, information management, management systems, valuation and legislation development. Tertiary education was enhanced locally through the establishment of formal education courses in property valuation at Thammasat University at both the undergraduate and postgraduate levels.
Phase 3 of the TLTP involved the extension and improvement of land administration service delivery through the introduction of new technologies and the re-engineering of land office processes. Despite the downturn in the Thai economy as a result of the 1997 crisis, the Central Valuation Authority continued to pursue capacity building strategies and its operational efficiency was increased through training, developing and piloting computer-assisted and market-based valuation methods. With the further objective of improving land efficiency, the Department of Lands embarked on a program of decentralization through the establishment of 90 branch land offices and the implementation of new automated, semi-automated and manual land registration systems at appropriate offices throughout their network. Additionally, 36 land adjudication centers were established as a result of the restructuring and staffed with personnel trained in adjudication.

**Learning and Experimentation**

A noted previously, a focus on staff training and tertiary education in support of land titling initiatives was an integral part of the project. AusAID worked to actively promote and institute high-quality in-country tertiary education, and to promote continuing education for Department of Lands staff.

**External Catalysts**

The effectiveness of the projects implementation in Thailand was enhanced by the existence of a recognition of the importance of land titling by the Royal Government of Thailand, and the fact that many policies and much of the infrastructure supporting land titling was already in place. This meant that this World Bank/AusAID initiative was widely accepted and appreciated by all stakeholders, and the work environment was supportive. Reform and capacity building was welcomed by the Department of Lands and the Royal Government of Thailand, and this support was one of the key drivers of this project.

**Lessons Learned**

The success of the Thai Land Titling Project has meant that a considerable amount of project review and appraisal has taken place in addition to the normal project evaluation process. The 2000 AusAID review of land titling projects, “Improving access to land and enhancing the security of land rights: A review of land titling and land administration projects” examined factors contributing to the success of the Thai Land Titling project in detail, and drew a number of “lessons learned” that could be applied to future land titling projects.

In addition, a major corporate participant in the project, BHP, produced a paper entitled “10 Pillars of Land Titling”, focusing on the components of a successful land project. These ten pillars were identified as:

1. **Land titling is a means to an end, not an end in itself.**
   
   Land titling must be continually demonstrated to support fundamental quality of life issues
confronting developing nations. If not, commitment from government will waver and the participation and confidence of the community will be difficult to achieve.

2. **Land titling needs commitment to national reform.**
   A commitment to change at the highest levels is required. Clear and consistent policy and legal framework is important.

3. **Land titling is about people, not technology.**
   The initial emphasis must be on process improvement and the expansion of the bureaucratic skill base, with a particular emphasis on the development of future leaders.

4. **Land titling is more than a project – it is a way of life.**
   Land titling is a long-term program aimed at bringing about reform to the national system of land administration. To be successful, people in institutions need to change.

5. **Technology provides the tools, not the standards.**
   Land administration is strongly influenced by the bureaucratic, social and cultural environment, and overlooking existing practice often leads to failure. It is important to review existing manual procedures and to then simplify and streamline where appropriate.

6. **Successful land titling requires community support.**
   The process of land titling should be public, open to all, and actively involve village officials. Fees must be transparent and the results of the adjudication must be publicly displayed.

7. **Get the runs on the board quickly.**
   It will reassure policy makers that land titling is viable if early key results can be demonstrated.

8. **Work from the part to the whole in developing land law.**
   It can take considerable time to develop and implement high level land law. Lower level legal instruments such as ministerial decrees are often useful.

9. **Land titling requires production orientation.**
   Land titling is a production process that requires a series of coordinated actions. A key element is the setting of output targets, and it is important that there be quality control and monitoring.

10. **Ensure an appropriate reward for field staff.**
    Land titling personnel can spend long periods over many years in the field. If field staff are not adequately rewarded, there will be repercussions either in quantity or quality or work, or in the manner in which they seek to establish an informal reward system.

    Further, the AusAID review outlined a number of key lessons learnt, including:

    - Project initiators should ensure that project rationale and objectives are directed to well articulated and defined development problems; that outputs are realistic and achievable; that the technical methods and systems introduced are culturally acceptable, affordable and sustainable; and that there is a high likelihood of the benefits continuing to be achieved long after the project has ceased.
• Project initiators should ensure that the design time is adequate to allow the recipient country staff to contribute, to understand the proposed outcomes, and to feel they own the project design.

• The social and gender aspects of land titling should be given more importance in design and implementation to avoid potential adverse impacts on particular socioeconomic groups and to ensure that the target groups are beneficiaries. It is essential to effectively monitor social and gender aspects throughout the life of the project, and preferably beyond. Quality baseline studies for social and economic evaluation are necessary, and it is useful to closely monitor the progress and validity of assumptions, indicators of sustainability, and benefit achievement.

• The design team should include expertise in development, social and gender issues as well as technical aspects.

   The following detailed lessons learnt were noted:

   • For advisers, the cultural and language barriers are not quickly overcome; long-term advisers working closely with well-selected counterparts can minimize the effects.

   • Advisers must transition effectively from the analysis and recommendation phase to overseeing and guiding the change process when appropriate.

   • Systematic land adjudication was the most effective approach to accelerated land titling under Thai conditions. Targets for land titling under this approach must consider constraints such as unclear boundaries with forestry, land reform areas, and lack of clear ownership evidence. A titling rate of 80% of parcels identified by the adjudication teams was a realistic target.

   • Sustainable institutional change requires a long-term framework and sustained efforts, often beyond the time horizon of one project.

   • Land titling and land reform efforts need to be grounded in an overall rural development strategy that weights the relative cost and likely impacts of various alternatives for reducing rural poverty and improving natural resource management.

   • Clear policy direction is needed to bridge the gap between technical change and longer-term institutional development.

   • Factors essential to project success include strong management, particularly in the planning and implementation of systematic adjudication and land titling, continuous technical assistance by a resident team of advisers, and flexibility in project implementation, as was demonstrated by the readiness to shift resources toward more ground surveys to achieve appraisal titling targets.

   • To support the evolution of the project environment, it is important that the emphasis for technical assistance inputs shift from analysis and recommendations for change to overseeing and guiding the change process. Advisers’ final reports are less important than
the impact that the advisers have on their area of responsibility. Change will occur more readily while the advocate is present to follow up on recommendations.

- Targets should be established in terms of area covered, not number of titles issued. A focus on area targets will provide titling agencies with an incentive to clarify boundaries between private and state domain and give a clearer sense of the gaps left by a first sweep of systematic adjudication. In the absence of data about the size of these gaps it will be difficult for the government to make an informed decision about whether to conduct a second sweep, or simply to leave the areas uncovered to sporadic adjudication.

- There is a need to provide farmers in the Land Reform Areas with efficient land surveying services, define and mark forest boundaries to enable the titling of contiguous lands and share land information data more effectively between government agencies. All these undertakings are best programmed and implemented within a common policy and institutional framework for land management and administration. Such a framework would enhance the co-ordination of policies and programs undertaken by the various agencies responsible for land reform, land titling and registration, forestry and land conservation, property valuation and property tax assessment.

   The case for freeing up land in state hands should be carefully considered. The return to deregulation, if accompanied by appropriate policing of core reserve areas, is likely to generate larger social benefits than titling areas already in the private domain where land rights are not a source of conspicuous conflict. In Thailand, areas in the private domain offered relatively secure tenure to farmers before the titling program. A large number of farmers occupy reserve land that, in many cases, is appropriate for farming; land that does not offer critical environmental services and is beyond the means of the government to protect. Farmers on encroached reserve land are deprived of the benefits – principally, improved access to formal credit – extended by the titling program.
REFERENCES
