

21100

MUNICIPAL FINANCE

5

BACKGROUND
SERIES

Strategic Municipal Asset Management

Worley International, Ltd.

APRIL 2000



The World Bank

URBAN
& LOCAL GOVERNMENT

TABLE OF CONTENTS

Section	Page
ACKNOWLEDGEMENTS	i
EXECUTIVE SUMMARY	ii
1.0 INTRODUCTION	1
1.1 Background	1
1.2 Terms of Reference	2
1.3 Methodology	3
2.0 REVIEW OF MUNICIPAL ASSET MANAGEMENT PRINCIPLES AND CONCEPTS	4
2.1 Introduction to Asset Management	4
2.2 Basic and Advanced Asset Management	5
2.3 The Asset Management Plan	5
2.4 Advanced Asset Management	7
2.5 Asset Management Improvement Planning	9
2.6 Summary	11
3.0 THE EVOLUTION OF MUNICIPAL ASSET MANAGEMENT IN NEW ZEALAND AND AUSTRALIA	13
3.1 New Zealand	13
3.2 Australia	14
3.3 The Application of Municipal Asset Management in New Zealand and Australia	14
3.4 Summary	15
4.0 REVIEW OF THE INTERNATIONAL EVOLUTION OF MUNICIPAL ASSET MANAGEMENT	17
4.1 Developed Countries (USA and UK)	18
4.2 Developing Countries (South East Asia/Pacific)	19
4.3 Summary	20
5.0 CASE STUDIES AND POTENTIAL PILOT STUDIES	22
5.1 Best Practice Case Studies	22
5.2 Potential Pilot Studies	24
6.0 CONCLUSIONS	29
6.1 Summary	29
6.2 Key Findings	30
REFERENCES AND BIBLIOGRAPHY	30

ACKNOWLEDGEMENTS

This report has been produced by Worley International Limited, on behalf of the World Bank. The New Zealand Government funded the costs associated with preparation of the report, through the New Zealand Consultants Trust Fund.

The authors of this report were Tony Urquhart and Warwick Busch of Worley International Limited. The report was reviewed by Dr Ian Parton of Worley International Limited.

The authors wish to gratefully acknowledge the help received from the following people during the preparation of this advisory note:

- Michael Schaeffer, Angela Griffen, Mats Andersson, Margret C. Thalwitz, Omar M. Razzaz, Pilar Solans, Hiroaki Suzuki and Samir El Daher of The World Bank.
- Roger Byrne of Gutteridge Haskins and Davey Pty Ltd, Melbourne, Australia
- Dr Penny Burns of AMQ International, Adelaide, Australia

EXECUTIVE SUMMARY

This report examines international experience and practices in strategic municipal asset management, with a particular focus on the evolution of asset management in Australia and New Zealand, and provides an analysis of asset management methodologies identified in these countries.

The report considers the implications of these approaches for the World Bank and its client countries and suggests a broad approach for implementing asset management in developing countries, based on a process of continuous improvement. It also provides case studies and pilot studies for future consideration.

Definition of Strategic Municipal Asset Management

Strategic Municipal Asset Management is an approach to develop and maintain municipally owned infrastructure assets to ensure that:

- (i) Asset requirements and asset management strategies are driven by defined service levels and performance standards.
- (ii) Scarce financial resources are properly allocated and managed to optimize investment in infrastructure.
- (iii) A long-term (life-cycle) approach is taken when determining asset operations, maintenance, renewal and development strategies.

Asset management is an evolving process that improves as understanding of asset condition, performance and operational costs improve, in conjunction with improved decision-making processes.

Best Practice Asset Management

To achieve 'best practice' in asset management, organizations must be able to demonstrate:

- (i) Knowledge of levels of service required by customers
- (ii) Ability to predict future demands for service
- (iii) Knowledge of ownership of existing assets
- (iv) Knowledge of physical condition of assets
- (v) Knowledge of asset performance and reliability
- (vi) Knowledge of asset utilization and capacity
- (vii) Ability to predict the failure modes and estimated time of failure for assets
- (viii) Ability to analyze alternative treatment options
- (ix) Ability to rank works based on economic analysis
- (x) Ability to prioritize works to suit the available budget
- (xi) Ability to develop and revise strategic objectives for each asset
- (xii) Ability to optimize operations and maintenance activities.

Asset Management Plans

The key tool to manage assets effectively is the asset management plan.

Asset management plans are long-term plans for managing an organization's infrastructure asset portfolio so as to achieve the organizations strategic goals and to provide a mechanism for integrating an organisation's strategic planning and budgeting processes. An asset management plan would usually include:

- (i) Strategic goals,
- (ii) Levels of service and performance standards,
- (iii) Growth and demand projections,
- (iv) Asset management strategies,
- (v) Asset management tactics,

- (vi) Financial projections including cash-flow forecasts,
- (vii) Monitoring, control and review mechanisms,
- (viii) An asset management improvement plan.

Improvement Planning

To ensure these activities evolve and improve in a planned and progressive manner, a detailed improvement plan is required, which outlines the specific improvement tasks, timeframes and resources required.

Measuring and monitoring asset management performance against the proposed improvement plan is an essential step in achieving improved asset management practices.

Lessons from Developed Countries

Australia and New Zealand are representative of current world best practice in municipal asset management. New Zealand has the most holistic asset management approach (involving asset management plans and improvement programs) whereas Australia leads advanced asset management techniques and disclosure practices.

The key conditions identified which have contributed to successful implementation of asset management in developing countries are:

- (i) Structural and supporting legislative reforms that require prudent and sustainable long-term financial planning, which have in turn led to explicit accounting standards and reporting requirements.
- (ii) Support systems to improve understanding, and the ability to quantify long term benefits of asset management, such as:
 - Development of planning guidelines,
 - Training and awareness raising,
 - Development of computerized asset registers and decision making tools.
- (iii) Regular monitoring of asset management performance to ensure improvements are achieved.

Implementing Asset Management in Developing Countries

Achieving asset management improvements in developing countries will require the development of a long-term vision for asset management, the realization of which is broken down into short-term achievable steps.

In many developing countries the initial focus will be on:

- Developing basic asset inventories;
- Documenting asset operation and maintenance processes;
- Developing primary asset information systems;
- Preparing basic asset management plans;
- Developing skills and awareness.

Achieving these initial steps may take some years, and therefore short-term achievable milestones need to be developed, supported by monitoring programs and incentives for achievement.

Additional incentives may be required to overcome barriers to the successful implementation of improved asset management practices in developing countries. Embedding asset management improvement targets and performance measures into municipal infrastructure projects may provide the incentive mechanism for effectively improving asset management practices.

Developing countries typically fall into two categories for the purpose of assessing their priority needs for asset management improvement. The first (countries such as Vietnam, Cambodia and Laos) are those requiring basic awareness raising, skills and asset information, to achieve minimum sustainable management standards. The second category of countries (such as Fiji and India) require more comprehensive training and techniques to provide a platform for improved system efficiency and private sector investment.

1.0 INTRODUCTION

1.1 Background

The World Bank has recently introduced a new “Urban and Local Government Strategy”. This new strategy is in response to increased demand for World Bank assistance from local governments, as well as an understanding that effective urban development is directly linked to the raising of living standards and the promotion of equity.

The Urban and Local Government Strategy is based on a vision of sustainable cities which are:

- ***Livable** – committed to ensuring that the poor achieve a healthful and dignified living standard; that provide systems for adequate housing, secure land tenure, credit, transportation, health care, education, and other services for households; and that address environmental degradation, public safety and cultural heritage preservation for the benefit of all residents. And to be livable, cities must also become:*
- ***Competitive** – providing a supportive framework for productive firms, to promote buoyant, broad-based growth of employment, incomes and investment.*
- ***Well governed and managed** – with representation and inclusion of all groups in the urban society; with accountability, integrity, and transparency of government actions in pursuit of shared goals; and with strong capacity of local government to fulfill public responsibilities based on knowledge, skills, resources and procedures that draw on partnerships.*
- ***Bankable** – that is, financially sound and, at least for some cities, credit worthy. Financial health of municipalities requires the adoption of clear and internally consistent systems of local revenues and expenditures, transparent and predictable inter-governmental transfers, generally accepted financial accounting, asset management, and procurement practices, and prudent conditions for municipal borrowing.”*

To achieve these four interrelated objectives efficient municipal management and delivery of infrastructure dependent services are of key importance.

Improving the management of municipal infrastructure can bring major benefits by ensuring that scarce resources are used in the most cost effective manner, thereby enhancing economic growth, improving living standards and improving environmental sustainability. Inefficient use of resources for infrastructure can place a major burden on public finances, diverting resources that might otherwise go to education, healthcare and meeting other social objectives.

Many municipalities have traditionally tried to meet infrastructure needs through investment in infrastructure creation, without recognizing the long-term life-cycle costs associated with the ongoing operations, maintenance and renewal of infrastructure. This has led to below-cost tariffs and has undermined the financial position of municipalities, leading to difficulties in financing maintenance and renewal activities.

Strategic Municipal Asset Management is an approach to develop and maintain municipally owned infrastructure assets to ensure that:

- (i) Asset requirements and the management of municipal assets is driven by defined service levels and performance standards, and are linked to strategic planning objectives.
- (ii) Scarce financial resources are properly allocated and managed to optimize investment in infrastructure.
- (iii) A long-term (life-cycle) approach is taken when determining asset operations, maintenance, renewal and development strategies.

The benefits of improving asset management planning practices include:

- Improved understanding of service level options and costs;
- Improved decision making based on the benefits and costs of alternatives;
- An ability to better communicate and justify investments to stakeholders;
- An ability to demonstrate responsible investment in infrastructure;
- Improved knowledge of the timing and magnitude of future investments required to operate, maintain, renew and acquire assets;
- An ability to establish and evaluate performance benchmarks.

1.2 Terms of Reference

In June 1999, Worley International Ltd (Worley) was engaged by the World Bank Urban Group to prepare this Advisory Note on strategic local government (municipal) asset management policies, plans and methodologies for local municipal governments; and the relationship between strategic asset management and long-term financial planning.

The specific tasks and outputs required by the World Bank are:

- (i) In consultation and coordination with the World Bank Task Manager, the consultant will identify and review existing asset management policies, plans and methodologies in a representative sample of local governments from throughout the world (*Section 4*).
- (ii) In particular, the consultant will review and provide the World Bank with an extensive understanding as to the evolution and implementation of long-term strategic asset and financial management policies in New Zealand and Australia (*Section 3*).
- (iii) The consultant will survey existing asset management literature and best practices from academic, commercial and municipal government sources. As part of the agreed output, the consultant will provide an extensive bibliography (*Appendix C*).
- (iv) With respect to strategic local government asset management, the consultant will provide the World Bank Task Manager with an informed analysis with respect to the following non-extensive list :
 - Basic Concepts;
 - Management Principles;
 - Suggested Methodology;
 - Management Control;
 - Integrated Planning;
 - Acquisition Decisions;
 - Operations;
 - Disposal and
 - Accounting and Valuation.
- (v) The consultant should provide suggestions for prospective case study analysis and review (*Section 5*)
- (vi) The consultant will deliver a detailed advisory note of not more than 30 pages, (excluding appendices and bibliography) that meets the objectives and tasks outlined above.
- (vii) The consultant will submit the draft advisory note to the Task Manager.
- (viii) Prepare a final draft that incorporates comments received from the Task Manager.

- (ix) Submit final draft to the Task Manager.
- (x) Travel to Washington, DC to present report to Bank in form of a workshop.

1.3 Methodology

The methodology used in preparing this report included:

- (i) A literature search for relevant material which outlines the status of and methodologies used by municipalities;
- (ii) Identification of a representative sample of municipalities, central government agencies and professional associations from New Zealand, Australia, the United States and South East Asia;
- (iii) A review of the evaluation and implementation of long-term strategic asset management policies in New Zealand and Australia including discussion with key organizations and individuals involved in the development of asset management practices;
- (iv) Visits to selected sites in Australia and South East Asia to identify both the success factors and barriers to the implementation of improved asset management practices, and the current status of asset management practices;
- (v) A presentation of the initial findings of this study to the World Bank in Washington DC on 17 June 1999, and incorporation of World Bank feedback;
- (vi) Incorporation of the study findings into an 'advanced asset management' model for municipal asset management.

2.0 REVIEW OF MUNICIPAL ASSET MANAGEMENT PRINCIPLES AND CONCEPTS

2.1 Introduction to Asset Management

All of the world's urban cities are underpinned by a vast infrastructure network of roads, water supply, sewerage, drainage, power supply, flood protection, recreational and other assets. These are predominantly managed by local and central governments, and constitute a major investment over many generations, made in the hope that benefits will accrue through increased productivity, improved living conditions and greater prosperity.

Municipalities manage the world's largest portfolio of infrastructure assets on behalf of their communities. It is therefore particularly appropriate for municipalities to be vitally interested in asset management issues, and in particular the techniques that aid responsible asset management.

A formal approach to the management of infrastructure assets is vital for municipalities if they are to provide infrastructure in a cost effective and sustainable manner.

The key elements of effective asset management are:

- (i) Defined service levels and performance standards linked to strategic objectives,
- (ii) Optimal investment,
- (iii) A long-term (life-cycle) approach.

These key elements are typically outlined in a document called the **asset management plan**. The typical contents of an asset management plan are outlined in more detail in *Section 2.3*.

Asset management activities (which support the production of an asset management plan) typically include:

- Consultation with stakeholders and definition of strategic goals;
- Ongoing review of service levels and performance standards;
- Planning for future asset requirements and reviewing the adequacy of current asset portfolios, based on growth projections and service levels;
- Collecting and maintaining asset registers and performance information;
- Continually assessing and reviewing asset management options to ensure that optimal operations, maintenance, renewal, acquisition and disposal decisions are made, taking into account both social and economic objectives;
- Accounting for assets in such a way that the true cost of services provided can be calculated, and future investment needs required to maintain the 'service potential' of the assets can be determined;
- Auditing asset management performance (the practices, procedures and systems used to make asset management decisions) and continuously monitoring and improving these asset management processes to ensure improvement.

The breadth of application of asset management extends from the identification of community and customer expectations to the daily operation of facilities required to meet defined levels of service. The process of linking customer expectations and strategic objectives through to daily activities is illustrated in Figure 2.1.

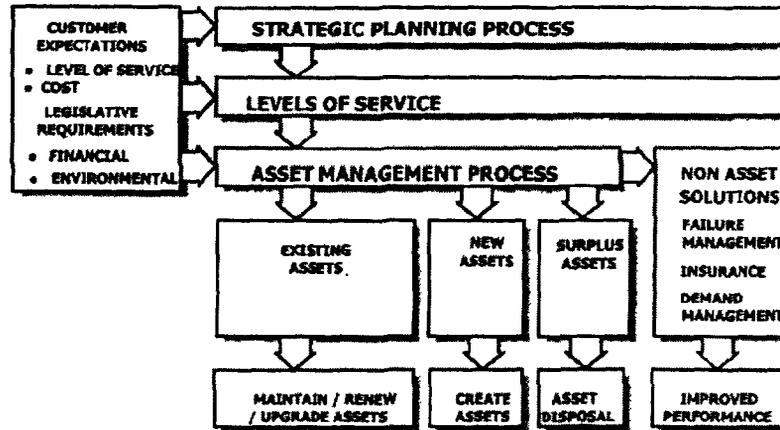


Figure 2.1: Total Asset Management Planning Process

2.2 Basic and Advanced Asset Management

Asset management is undertaken at various levels of sophistication. Initially, plans are often developed at a level designed to provide basic technical management outputs such as forward replacement programs and associated financial projections. This is referred to as the ‘basic’ approach to asset management planning.

An ‘advanced’ approach seeks to optimize activities and programs through the collection and analysis of detailed information about asset condition, performance, life-cycle costs and management options, therefore providing the required level of service at least cost.

2.3 The Asset Management Plan

Asset management plans are long-term tactical plans for managing an organization’s infrastructure asset portfolio so as to achieve the organization’s strategic goals. They provide a mechanism for integrating an organisation’s long-term strategic planning processes with its operations and capital budgeting activities. Asset management plans are typically prepared for a specific infrastructure service or activity provided by an organisation (e.g. water supply, sewage disposal or roads).

An asset management plan would usually include:

- (i) Strategic goals;
- (ii) Levels of service and performance standards;
- (iii) Growth and demand projections;
- (iv) Asset management strategies;
- (v) Asset management tactics;
- (vi) Financial projections including cash-flow forecasts;
- (vii) Monitoring, control and review mechanisms;
- (viii) An asset management improvement plan.

The asset management components are considered below in more detail:

(i) Strategic Goals

In order for an asset management plan to be effective it must fully support the strategic goals of the organization, municipality or government it is being prepared for. To ensure that the plan is consistent with the general aims, the strategic goals must be clearly defined as part of the plan.

(ii) Levels of Service and Performance Standards

This section of the plan clearly defines the levels of service or performance standards that are required and the basis of the decision to provide these levels of service. The service levels must support the strategic goals outlined in (i) above and be based both on customer expectations and legislative and regulatory requirements.

Typical levels of service would include measurable performance standards relating to:

- Quality;
- Quantity;
- Reliability and availability;
- Safety;
- Economic efficiency;
- Environmental objectives.

(iii) Growth and Demand Projections

This section provides details of growth and demand forecasts which affect the need for and utilization of assets. As well as overall population growth, this section must consider issues such as future changes in technology (which may alter the way in the service is delivered), changes in legislation (such as environmental standards), and changes in customer expectations.

(iv) Asset Management Strategies

This section outlines the broad strategies or actions required to achieve the goals and standards outlined in sections (i) or (ii).

(v) Asset Management Tactics

This is the most important section of the asset management plan as it outlines the individual steps required to implement the strategies in (iv) above. This section is essentially the life-cycle management plan for the asset portfolio. It would include:

- A description of the assets in physical and financial terms;
- Detailed operations, maintenance, renewal, acquisition and disposal strategies.

(vi) Financial Projections including Cashflow Forecasts

This section outlines the long-term financial requirements for management of the asset portfolio, based on the long-term strategies and tactics outlined earlier in the plan. This section should also include details on:

- The long-term cost streams for operations, maintenance, renewal, acquisition and disposal activities;
- How the asset management activities will be funded;
- Forecasts of future asset valuation and depreciation;
- A summary of the key assumptions made in the financial forecasts.

(vii) Monitoring, Control and Review Mechanisms

This section outlines the monitoring mechanisms in required to:

- Assess the effectiveness of the strategies and tactics outlined in the plan;
- Modify the strategies and tactics if necessary.

(viii) Asset Management Improvement Plan

This section outlines improvements required to asset management practices to improve the future level of confidence in the asset management plan strategies and financial projections.

It is essential that the improvement tasks, and the human and financial resources required to improve asset management activities, are outlined in this section. This ensures that both future asset-related activities (outlined in earlier sections of the plan), and improvements in asset management business practices are planned and budgeted for.

Improvement planning is outlined in greater detail in Section 2.5.

2.4 Advanced Asset Management

Advanced asset management employs tools such as failure prediction modeling, risk management and economic investment analysis techniques in order to evaluate options and identify the optimum long-term strategy to deliver a particular level of service. This strategy is supported by:

- Well defined and agreed levels of service and performance standards;
- Accurate and detailed asset data (physical and financial);
- Well defined and implemented business decision-making and management processes to ensure the asset portfolio is optimally managed;
- An information system which manages physical and financial data, with advanced asset management functionality. Advanced functionality includes functions such as predictive modeling, risk assessment, failure mode analysis, and optimized decision-making capability.

Figure 2.2 illustrates an advanced asset management-planning model.

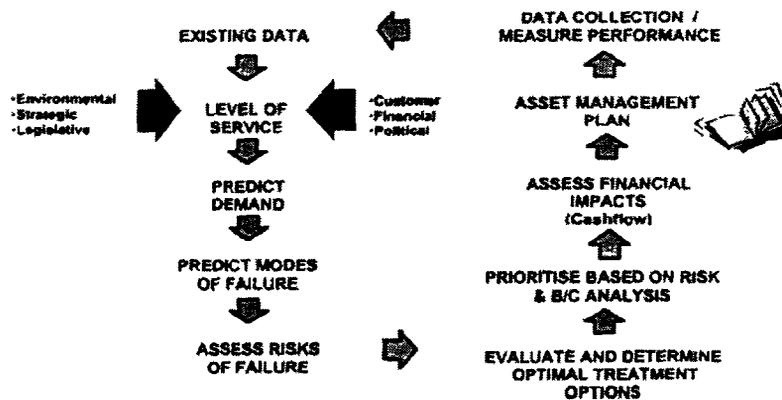


Figure 2.2: Advanced Asset Management Planning Model

In order to implement the above process and achieve ‘best practice’ in asset management, organizations need to be able to demonstrate the following capabilities:

a) Knowledge of Levels of Service

It is important that asset owners measure the current levels of service their assets deliver, their customer’s expected level of service, and customers willingness to pay for that level of service. In doing so the asset owner can better manage the level of service to match the expectations of customers, and their ability to pay.

b) Ability to Predict Future Demand from Customers

Future demand should be forecast so that both the impact on the asset and the need future investment can be predicted with confidence.

c) Knowledge of Asset Ownership

Knowledge of ownership of assets is the most important aspect of asset management. Planning for asset renewal and maintenance activities cannot proceed until organizations know exactly what assets they own, and where these assets are located. Developing a sound asset inventory (at an appropriate level of detail) is a prerequisite to asset management planning.

d) Knowledge of Physical Condition of Assets

Understanding and monitoring the condition of assets enables prediction of future management requirements, renewal liabilities and risks.

e) Knowledge of Performance of Assets (Reliability)

Asset owners must to be able to measure and understand the performance of their assets in order to assess the effectiveness of operational, maintenance and capital works programs.

Therefore information needs to be available on the types of failure, number of customers affected and the degree to which the failures affect the target level of service. This will enable the point in time at which performance will drop to an unacceptable level to be predicted.

f) Knowledge of Current Utilization & Ultimate Capacity

In order to know when to upgrade or augment existing assets, organizations require a clear understanding of the capacity and current utilization of assets.

Lack of understanding of capacity and utilization can lead to over investment in infrastructure, and inefficient use of scarce funds.

g) Ability to Predict Failure Modes of the Assets

There are several ways an asset can fail to provide its required level of service or reach the end of its effective life. Typical failure modes include:

- Structural/condition failure;
- Capacity failure;
- Obsolescence;
- Economic failure;
- Level of service/performance failure;
- Operator error.

Organizations should assess and understand the various ways in which an asset may fail and when that failure may occur, in order to determine what treatment options can be applied to overcome that failure.

h) Ability to Analyze Alternative Treatment Options

After predicting the failure mode of an asset, options available to mitigate the failure must be assessed. The strategies considered should include options such as changed operating procedures, maintenance, renewal, creating new assets, asset disposal and demand management.

i) Ability to Rank Works on Based on Economic Analysis

Asset management involves decisions as to how and when assets should be maintained and renewed at different stages during their life.

In assessing the relative merits of the various options the following must issues must be considered:

- The capital investment costs and timing;
- The recurrent operating and maintenance expenditure;
- The benefits (tangible and intangible) that will be derived from each treatment option; and
- The effectiveness (life-cycle) of the different treatment options.
- The impact on the levels of service delivered by the asset

j) Ability to Rationalize Works to Suit Available Budget

There must be a framework for assigning financial resources when budgets are constrained. This may include economic, social and other parameters.

k) Ability to Develop and Revise Strategic Objectives for Each Asset

All assets must have clearly identified objectives and performance measures against which operations and maintenance activities and performance monitoring are judged. The asset objectives must be aligned with the facilities objectives and the organization's business objectives. Revision of service levels, asset business functions, and performance measures should be carried out on a regular basis to ensure that the focus on business objectives and outputs is retained.

l) Ability to Optimize Operations and Maintenance Activities

Minimizing operations and maintenance costs through an optimal blend of planned and unplanned maintenance activities, and by operating the asset cost effectively, will have the greatest impact on life-cycle costs.

2.5 Asset Management Improvement Planning

Asset management is an evolving process that improves as the condition, performance and operational cost requirements of assets become better understood. To ensure that supporting activities are improved and incorporated into asset management plans, an improvement plan is required to accomplish this in a planned and progressive manner.

A typical methodology for preparing an asset management improvement program is:

- (i) Review the current status and level of sophistication of asset management activities within the organization including:
 - (a) *Processes* used in the implementation of asset management activities;
 - (b) *Asset data and knowledge*, its appropriateness, reliability and accessibility;
 - (c) *Information systems* to support (and often replicate) asset management processes and store and manipulate data;
 - (d) *Asset management plans* to identify the optimum life-cycle management tactics and resources;

(e) *Implementation tactics* including organizational, commercial and people issues.

The key activities typically reviewed are shown in Figure 2.3.

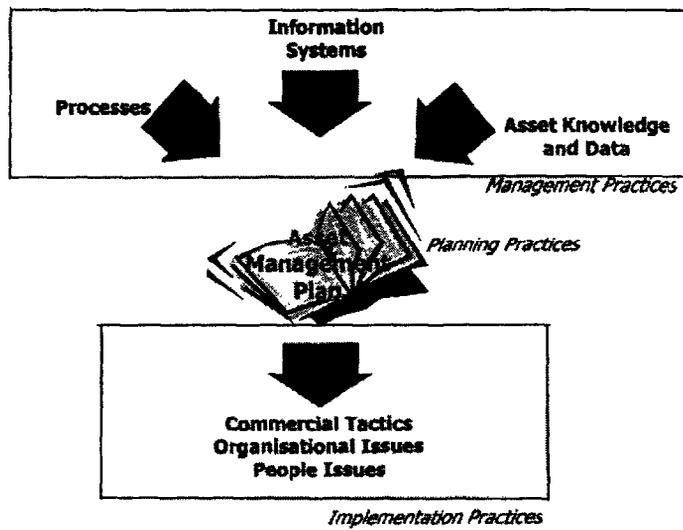


Figure 2.3: Asset Management Improvement Planning Components

- (ii) Identify a 'future vision' (10 years plus) and 'appropriate practice' (2-3 year target) for the organization in terms of asset management practices.
- (iii) Complete a gap analysis by assessing the differences between 'current' and 'appropriate' asset management practice).
- (iv) Determine options, costs and benefits to overcome identified gaps.
- (v) Adopt an achievable improvement program (2-3 years).
- (vi) Determine a final long-term improvement program.
- (vii) Monitor and review the implementation program.
- (viii) Complete regular reviews (continuous improvement monitoring).

The concept of establishing the organization's current asset management status, appropriate practice (short-term goals) and staged improvement is illustrated in Figure 2.4.

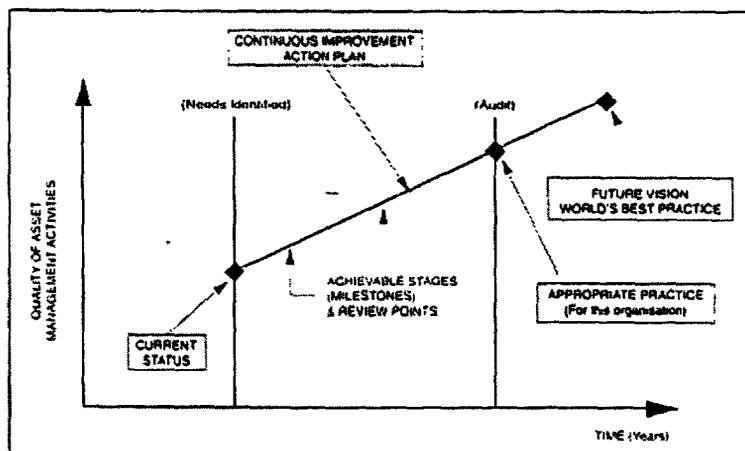


Figure 2.4: Asset Management Continuous Improvement

Typical milestones in a long-term improvement program are outlined in Table 2.1 below:

Stage 1 Improvement Strategy Development	Needs analysis/status assessment Setting base strategy/asset management objectives Asset data classification/collection priorities confirmed Asset management improvement program adopted
Stage 2 Basic Asset Register	Set up basic asset register/asset management information system Identification of all assets Basic data captured Asset replacement cost/timetable determined Initial asset management plans Current levels of service identified Basic valuations prepared
Stage 3 Basic Asset Management	Improve attribute data Introduce basic condition assessment Valuation based on condition Optimize data collection for critical assets Maintenance history data identified Second generation (basic) asset management plans prepared Renewal decision-making processes documented Determine target levels of service based on customer/stakeholder consultation Costs captured against assets
Stage 4 Improved Maintenance Management	Review maintenance procedures Apply improved procedures to assets Schedule procedure intervals Review maintenance plans for key assets Begin to introduce asset criticality analysis and risk management
Stage 5 Introduce Advanced Asset Management Techniques	Complete failure analysis on all key asset groups and critical facilities Complete consequence of failure (risk management) analysis on all assets Apply these findings to the life-cycle strategy and maintenance plans for assets Valuations based on true economic lives
Stage 6 System Optimization (This stage may be introduced earlier for critical assets)	Optimized life-cycle and economic decision making used for planning levels of service, based on ongoing customer consultation All options for overcoming failures analyzed Benefits/costs of each option quantified Most appropriate strategy for each asset, facility or system identified Advanced asset management plans developed.

Table 2.1 Typical Milestones in Improving Asset Management

Each step outlined above (excluding stage 1) may take some years to achieve.

In least developed organizations and countries evolution to stage 2 only may be realistically achieved in the medium or long term. It is therefore essential that the appropriate practice identified is achievable.

2.6 Summary

The key elements of asset management identified are:

- (i) Defined service levels and performance standards linked to strategic objectives,
- (ii) Optimal investment,

(iii) A long-term (life-cycle) approach.

The key document that outlines these elements is the asset management plan.

Asset management is an evolving process that improves as understanding of asset condition, performance and the operational costs required improve, in conjunction with improved decision-making processes.

There are a number of key capabilities that an organization must possess or develop in order to be an effective 'asset manager'.

To ensure that these activities evolve and improve in a planned and progressive manner, a detailed improvement plan is required, which outlines the specific improvement tasks, timeframes and resources needed to implement the improvements.

Measuring and monitoring performance against the proposed improvement plan is an essential step in achieving improved asset management practices.

3.0 THE EVOLUTION OF MUNICIPAL ASSET MANAGEMENT IN NEW ZEALAND AND AUSTRALIA

3.1 New Zealand

Since the mid-1980's New Zealand has undergone a period of far reaching structural reforms aimed at improving the internal efficiency of the economy while simultaneously bringing greater stability to the macro economy.

There has been an extensive agenda intended to open individual sectors of the economy to competitive pressures and to allow market signals to dominate investment, production and consumption decisions with the aim of improving the productive potential of the economy.

Public sector (including municipal) reform has been aimed at both reducing the role of government (central and local) in the provision of goods and services, and improving the efficiency of the public sector.

Reforms over the last decade include:

- Implementation of far-reaching reforms in New Zealand's public sector intended to achieve fiscal savings, increase efficiency, and focus on those activities for which government involvement remains appropriate. Beginning in 1987, government-owned trading enterprises involving energy, transport, banking, insurance, forestry, construction, air traffic control, property, communications and broadcasting were restructured or corporatised to emphasize managerial accountability for profitable operations. This has resulted in marked increases in efficiency and improved profitability of most state businesses.
- Privatisation of State-Owned Enterprises (SOE's) and assets for which government ownership serves no specific social or economic purpose. Many government businesses and other assets have been sold since early 1988.
- Systematic reorganization of central and local government through a series of financial management reforms aimed at increasing the efficiency and accountability of public sector managers and the transparency of government decision-making with the introduction of full accrual accounting.
- Major reform of social services in education, health, superannuation and welfare benefits to achieve greater efficiency and improved resource use, to ensure that assistance is directed to those most in need, to encourage greater initiative and self-reliance, and to contain and reduce the fiscal cost of social services.
- Unwinding of a number of financial arrangements involving guarantees to energy-related projects and termination of concessionary financing of producer boards controlling major agricultural exports.

In the municipal sector the key influences on the development of improved asset management practices have been:

- Legislative reform requiring transparent and prudent financial management and long-term financial planning by municipalities.
- Infrastructure age and decay leading to replacement and maintenance of infrastructure assets being a growing proportion of municipal expenditure.
- Infrastructure decay and aging leading to failures and heightened awareness of the implications and cost of failure of infrastructure components.
- A requirement for municipalities to move from 'protective' to 'competitive' practices which has led to 'non-core' activities being outsourced to the private sector.

- A legislative requirement for municipalities to adopt accrual accounting techniques, include infrastructure assets in financial statements, and to recognize and fund depreciation of these assets to allow for future renewals and replacements.
- A requirement for municipalities to produce and adopt an “asset management improvement plan” which outlines the timeframe and physical and financial resources required to improve asset management practices.
- Advances in information systems enabling organizations to collect and manage asset inventory information for large asset portfolios at a detailed level, and analyze this information to make strategic level decisions.

Asset management plans effectively provide a means for municipalities to address these issues.

3.2 Australia

While Australia has not undertaken economic reforms to the extent that New Zealand has, both federal and state governments have implemented strategies aimed at securing gains in efficiency and productivity.

Australia has also sought to increase economic efficiency through programs of commercialization and privatization, which has affected utilities (electricity, gas, water) and transportation. Major structural change has also occurred in the public housing sector including separation of client service and asset management activities.

As in New Zealand these reforms are being implemented against a background of increasing community expectations as to the quality and extent of services provided by federal, state and local governments.

In Australia the asset management concept was tied into municipalities by Australian Accounting Standard 27 (AAS27) “Financial Reporting by Local Government” which requires infrastructure assets to be accounted for and included in financial statements.

The regulatory environment in which municipalities and utilities operate varies from state to state, however there has been a focus on regulating the prices of municipal services. This has led to municipalities and utilities developing more robust asset management practices, and detailed asset management plans, to support pricing audits undertaken by government regulators.

3.3 The Application of Municipal Asset Management in New Zealand and Australia

As a result of the state of development, complexity and variety of asset management practices, and the diversity of people and organizations involved in implementation, New Zealand and Australia municipalities developed an industry wide approach to these issues.

In New Zealand this response was spearheaded by the Association of Local Government Engineers New Zealand (ALGENZ) who initiated the formation of the National Asset Management Steering (NAMS) Group in 1995.

The NAMS Group, comprising representatives from both government and industry agencies and associations, was formed to develop and promote infrastructure asset management practices, policies and systems in New Zealand. This is an autonomous group, and its activities are funded by contributions from its member organizations, sales of asset management manuals and subscriptions to training seminars.

Key initiatives undertaken include:

- Development of the ‘New Zealand Infrastructure Asset Management Manual’ which provides municipalities with a comprehensive framework for complying with legislative asset management requirements.

- Development and delivery of an intensive series of training workshops aimed at developing support and enthusiasm for asset management, introducing participants to the key principles and concepts and assisting in the development of appropriate implementation strategies.
- Development of decision making and management tools (such as infrastructure management software systems) to aid municipalities in developing asset inventories, recording physical and financial information, preparing valuations, predictive modeling and economic analysis.

This national industry approach has enabled New Zealand municipalities to make rapid advances in improving asset management practices, and has provided the resources for the industry to draw on best practices in municipal asset management from throughout the world.

Australian municipal managers, driven by the Institute of Municipal Engineers Australia (IMEA), have undertaken similar initiatives, including the development of an Australian Infrastructure Asset Management Manual (on which the New Zealand manual was based). However, these activities have not been implemented to the extent as in New Zealand due to different regulatory frameworks between states, and a lack of explicit requirements for producing long-term asset management plans.

More recently the IMEA and ALGENZ have agreed to prepare an Australasian Infrastructure Asset Management Manual, which will incorporate current international best practice asset management methodologies. The new manual will encompass private sector industries such as electricity and gas, which have traditionally fallen outside the municipal domain but are subject to similar financial reporting requirements, management practices and customer expectations.

New Zealand municipalities are currently in the first year of a requirement to fund depreciation of infrastructure assets. This has resulted in an intensive focus on both valuation of infrastructure and on improving asset inventories and knowledge.

The requirement to fund depreciation has resulted in overall increases in local government taxes.

In New Zealand most municipalities have completed asset management plans for core infrastructure assets and there is now a focus on improving the robustness of these plans through improved asset inventory information and decision-making processes.

Australian municipalities are progressively improving their asset management approach but lack the national co-ordinated approach of New Zealand. However, state level regulators are progressively introducing more robust asset management planning requirements and practices to support pricing regulation.

In many cases the best examples of strategic asset management within New Zealand and Australia come from within organizations which have either been removed from, or given a degree of autonomy from, the municipal/local government framework. This can be attributed to three key drivers as follows:

- (i) Organizations given a degree of autonomy are less constrained by the resource limitations and political constraints of municipalities;
- (ii) A more commercial focus reinforces the need for investment planning to ensure long-term economic viability;
- (iii) More autonomous organizations are often subject to more stringent regulatory requirements than municipalities.

3.4 Summary

- New Zealand legislation requires that strategic asset management principles are applied to a diverse range of municipal asset portfolios owned and managed by municipalities.
- In Australia, legislative asset management requirements are generally limited to water, electricity and gas companies which are subject to price regulation.

- Accounting standards and/or public sector financial reporting requirements have been a key driver of asset management in New Zealand and Australia.
- In New Zealand, legislation implicitly requires municipalities to develop asset management plans. Combined with accounting and financial reporting standards, this has driven New Zealand municipalities to develop an integrated asset management planning approach that is becoming recognized as world best practice.
- A key success factor in New Zealand, and to a lesser extent in Australia, has been local government led initiatives including guideline development, training, and asset management information systems development.
- The best examples of strategic asset management within New Zealand and Australia come from within organizations which have either been removed from, or given a degree of autonomy from, the municipal/local government framework.
- As the structural reforms which have driven improved asset management practices in Australia and New Zealand are relatively recent, the concepts and processes developed represent the best of international thinking in asset management.

4.0 REVIEW OF THE INTERNATIONAL EVOLUTION OF MUNICIPAL ASSET MANAGEMENT

The asset management improvement planning components described in Figure 2.3 provide the framework used in Australasia for assessing the 'current' and 'appropriate future' status of asset management practices.

These components are typically broken down into the attributes supporting effective infrastructure asset management listed in Table 4.1.

<i>Management Practices</i>	<i>Planning Practices</i>	<i>Implementation Practices</i>
<p>Processes</p> <ul style="list-style-type: none"> • demand analysis • knowledge of assets • asset accounting/ valuation/pricing • strategic (life cycle) planning • asset creation/ disposal • asset operations • asset maintenance • job/resource management • review/audit processes <p>Asset Data & Knowledge</p> <ul style="list-style-type: none"> • identification/ categorization • location • physical attributes • condition • cost and maintenance histories • valuation <p>Asset Information Systems</p> <ul style="list-style-type: none"> • financial • asset register • plans records/GIS • maintenance management • condition • advanced applications 	<p>Asset Management Plans</p> <ul style="list-style-type: none"> • demonstrate understanding of assets • explicit levels of service • future demand • failure modes and consequences • operations and maintenance • works identification and prioritization • financial forecasts (cashflow and valuation) • asset management practices improvement plan 	<p>Commercial Tactics</p> <ul style="list-style-type: none"> • outsourcing non-core activities • contract structures • specification quality • monitoring procedures <p>Organizational Issues</p> <ul style="list-style-type: none"> • organizational structure • corporate commitment and understanding • roles and responsibilities <p>People Issues</p> <ul style="list-style-type: none"> • commitment/motivation • skill and age profiles • training programs • public consultation

Table 4.1: Attributes that Define Infrastructure Asset Management Best Practice

Organisations are frequently found to be strong in the use of some asset management practices but they are rarely so in all areas.

Figure 4.1 broadly summarizes the relative asset management capabilities of urban municipalities in typical high, upper middle, lower middle and low income countries. (This classification is based on definitions contained in The World Bank's Draft report titled "A Strategic View of Urban and Local Government Issues: Implications for the Bank")

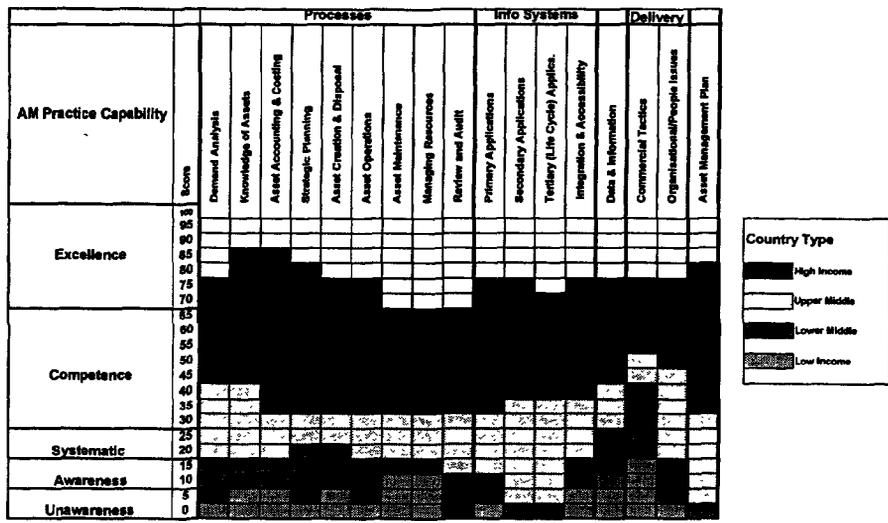


Figure 4.1 Typical Asset Management Capability by Country Type

Our review indicates that developing countries (lower middle and low income) usually have a ‘systematic’ approach to the use of asset management processes and some capability in the areas of data collection and commercial tactics, but generally have limited awareness of the use of asset management information systems.

4.1 Developed Countries (USA and UK)

4.1.1 United States

In the USA the Government Accounting Standards Board (GASB) is introducing more rigorous accounting practices for public sector organizations which require the development of accurate asset inventories and lay the foundation for improved asset management. The standards require municipalities to value and calculate depreciation for assets, undertake life-cycle costing, adopt accrual accounting methods and prepare annual financial statements.

The American Public Works Association (APWA) has formed a sub-committee to define asset management and oversee its development and application in the public works field, similar to the NAMS Group and IMEA in New Zealand and Australia.

Research and development of asset management concepts in the USA is limited although some municipalities have advanced capabilities in specific areas (such as the maintenance management, information systems and asset deterioration modeling capability developed by the City of San Jose as part of a computerized infrastructure management system). However there is little evidence of an overall life-cycle planning framework, as in Australia and New Zealand.

4.1.2 United Kingdom

In the United Kingdom (UK) the leading asset management practices have come from the water industry which operates in a privatized (since 1989) but heavily regulated environment.

Water companies are required to develop strategic asset management and business plans (which outline the investments required to meet service obligations) and submit these to the Office of the Water Regulation (OFWAT) for audit purposes. This requirement has driven water companies to develop robust business cases for future expenditure and led to the development of a more comprehensive asset management approach. As in the USA, many municipalities use sophisticated maintenance and contract management systems.

Many of the methodologies currently used in Australia and New Zealand are based on practices developed in the UK water industry.

4.2 Developing Countries (South East Asia/Pacific)

Asset management practices in a number of developing countries were examined as part of the study including Thailand, Laos, Cambodia, Vietnam, Fiji and India. The study found that there has generally been a pre-occupation with either creating new infrastructure, or with rehabilitating existing infrastructure, which has deteriorated due to years of conflict or lack of funds. Examples of this are the 27 km Madurai bypass road in Tamil Nadu, India and the National Highways Maintenance Upgrading Program in Laos respectively. Only basic asset registers exist, if at all, and the quality and extent of data is generally patchy in the developing countries mentioned.

There are examples of specific asset management activities being initiated such as the introduction of road asset management information systems, development of asset inventories, and the preparation of long-term capital development plans, and investment programs.

However our study found no evidence of an integrated asset management approach being taken, even where municipal infrastructure is largely in place such as in Bangkok, Thailand.

In all cases, specific asset management improvement projects were being funded by external agencies such as the World Bank and Asian Development bank. The sustainability of some projects, however, could be at risk due to:

- Lack of an overall life-cycle (long-term) management framework for the asset portfolio involved;
- A short or medium term financial interest by investors without ongoing measurement of performance and incentives to ensure that good management skills and practices are retained and improved into the future;
- Projects delivering too much too soon without a vision of how the outputs complement the wider picture of 'appropriate asset management' for the organization.

Our assessment of the catalysts for asset management change, and the current status of asset management practices for selected assets in the countries mentioned, are summarized in Figures 4.2 and 4.3 respectively.

Country	Asset	Catalyst for AM Improvements					
		Private sector invest	Improved Maint	Asset Failure	Govt Regulation	Economic Necessity	New Works
Thailand	Wastewater	✓		✓			
Laos	Roads		✓	✓	✓	✓	✓
Cambodia	Roads		✓	✓		✓	✓
Fiji	Roads	✓	✓				✓
India	Water	✓	✓		✓	✓	

Figure 4.2: Typical Catalyst for Change in Developing Countries

Country	Asset	Current AM Status*					
		Network AMP	Asset Knowledge	O&M Process	Asset Creation	System Data	Commercial Tactics
Thailand	Wastewater	2	3	2	4	2	4
Laos	Roads	1	1	1	4	1	3
Cambodia	Roads	1	1	1	4	1	3
Fiji	Roads	2	3	2	4	3	4
India	Water	1	2	2	4	1	3

* Rating; 1 = poor, 5 = strong

Figure 4.3: Typical Status of AM Practices in Developing Countries

Developing countries have a strong focus on asset creation and commercial tactics for developing and managing infrastructure, but lack an overall planning structure that enables optimization of future investment. The lack of government regulation as a driver of improved planning is significant.

In Bangkok, Thailand there is a strong desire to involve the private sector in managing and maintaining the network. Failure to keep pace with growth related development is driving current initiatives to improve operating and maintenance practices and efficiencies and attract private sector investment. There is some knowledge of network condition and performance, and practices for asset creation and implementing major capital projects are reasonably developed. However other asset management practices, including ongoing life-cycle asset management activities such as maintenance and renewal, are of poor quality.

In Laos and Cambodia the road asset management practices in even the capital cities of Vientiane (Laos) and Phnom Penh (Cambodia) are poor. Recent road rehabilitation projects could provide the catalyst for ongoing asset management improvement. Programs to improve asset management practices (funded as part of related ongoing loan projects) could ensure sustainable management of rehabilitated municipal roads in both countries.

Fiji is currently implementing a comprehensive Road Asset Management System and capturing relevant road asset attribute data but has not developed an overall plan to support ongoing management of the new system. The intention is to protect new road investments and promote private sector investment through performance based operations and maintenance contracts, but there is a need to lift other asset management practices to complement and support the new asset management systems to ensure their ongoing success.

Except for major cities and new schemes, urban water supply systems in the State of Tamil Nadu, India are in many cases near collapse and unable to properly supply their communities. Asset management practices are almost non-existent with management practices being mostly historical and too unsophisticated to have any impact on overwhelming water supply problems (such as chronic leakage and unauthorized supply). Unless existing water schemes have been evaluated for development purposes, there is usually no reliable record of current assets.

As with Fiji, there are real potential benefits to be gained through introducing improved asset management practices to support the introduction of private sector investment into water operations and maintenance activities. This will require some form of asset management plan. The process of asset management planning has already been initiated through the development of City Corporate Plans (CCPs) under the 'Government of Tamil Nadu 50 Cities Project'. However, to date little has been achieved to improve asset management practices to support the implementation of such plans.

The overall conclusion drawn from the above review of asset management practices in selected developing countries is that they fall into two categories:

- (i) Countries such as Vietnam, Cambodia and Laos that require the most basic asset management practices (related to asset knowledge, maintenance/demand management, increasing asset management skills and awareness) in order to ensure more sustainable asset creation/maintenance/rehabilitation outcomes. This group must first raise awareness and skills before the introduction of more comprehensive asset management practices will be successful.
- (ii) Countries such as Fiji and India, that require more comprehensive asset management practices (including asset management information systems and optimum rehabilitation plans) in order to promote full cost recovery, system efficiency and private sector investment into maintenance and rehabilitation activities.

4.3 Summary

Research and development of the asset management concept in the USA is limited although some municipalities have developed specialist capabilities. The Government Accounting Standards Board (GASB) has recently introduced accounting practices, which lay the foundation for improved asset management.

Financial reporting and tariff justification requirements have been the key driver of asset management for urban infrastructure in the UK.

The sophistication of asset management planning practices in low income and developing economies are well below those of the developed economies studied (New Zealand, Australia, UK and USA).

Developing countries typically fall into two categories for the purpose of assessing their priority needs for asset management improvement. The first are those that require basic awareness raising, skills and asset information, to achieve minimum sustainable management standards; the second require more comprehensive training and better techniques to provide a platform for improved system efficiency and private sector investment.

5.0 CASE STUDIES AND POTENTIAL PILOT STUDIES

This section outlines some examples of selected case studies of best practice asset management that provide a useful basis for analysis and review. It also identifies potential pilot projects in developing countries where targeted asset management improvement programs could be implemented.

5.1 Best Practice Case Studies

The following case studies demonstrate a comprehensive approach to best practice asset management in Australia and New Zealand. Each is discussed in relation to the best practice attributes summarized in Table 4.1:

5.1.1 Independent Pricing and Regulatory Tribunal (IPART), New South Wales, Australia

IPART's primary objective is to achieve the best pricing outcomes for declared water, electricity, gas and transportation monopolies and ensure effective access to these services. This is achieved through regular statutory capital/operating expenditure and asset management reviews to set medium term price paths for each service agency. IPART also promotes third party access to (corporatized) government monopoly infrastructure by developing access regimes.

(a) Best Practices Demonstrated

Management	:	Demand analysis, asset accounting/pricing, life-cycle (strategic) planning, asset creation/maintenance and operation, review and auditing.
Planning	:	Comprehensive and rigorous asset management planning.
Implementation	:	Contract structures (monopoly network access), public consultation.

(b) Best Practice Activities

These relate to pricing control, monopoly network access (competition) and consultation, demonstrated by:

- Assessing and quantifying the appropriateness of planned capital and operating expenditure for declared monopolies and utilities;
- Identifying relevant industry best practice relating to asset provision, utilization and service standards;
- Quantifying the impact of the reviewed agency's policies or costs relative to service, reliability, service levels and robustness of asset management plans;
- Collaboratively involving the agencies involved in all phases of the pricing review or access regime development.

(c) Comments

The IPART approach to price regulation and promoting access to monopoly networks is a best practice example that goes beyond simply reviewing the expenditure needs of each agency. It also relates decision-making to the rigor with which each agency manages their assets and develops their asset management plans. As a result, IPART has been the catalyst for steady improvement in asset management standards, industry, benchmarking and pricing efficiency for New South Wales gas, electricity, water and public transport monopoly services.

Watercare Services Ltd, Auckland, New Zealand

Watercare Services Ltd (Watercare) is the bulk water and wastewater utility authority servicing the Auckland region (1.3 million population). Watercare is a Local Authority Trading Enterprise (LATE) and is jointly owned by 6 Territorial Local Authorities in the region. It owns and operates assets with a replacement value of over NZ\$2 billion and, since being established in 1992, has been statutorily required to prepare a comprehensive asset management plan and consult with its consumer authorities on planning and pricing implications.

(a) Best Practices Demonstrated

- Management : Comprehensive approach to improving corporate asset management practices, annual review and audit of asset management practices.
- Planning : Comprehensive and rigorous asset management planning.
- Implementation : Public consultation, commitment to asset management improvement, monitoring procedures.

(b) Best Practice Activities

These relate to pricing control, quality of asset management planning, public consultation and continuous asset management improvement, demonstrated by:

- Annual development and updating of comprehensive asset management plans (water and wastewater) since 1992;
- Its asset management plan which contains all plan components recommended in the NZ national asset management guidelines;
- Consultation with 6 customer local authorities on asset management plan pricing and other impacts;
- Commitment to targeted 3 year asset management improvement program using a project team approach to achieving improvement objectives;
- A review and monitoring regime including annual report on improvement progress against 3 year targets plus external capital expenditure and operating expenditure audit.

(c) Comments

Despite not being advanced in the use of asset management systems for decision-making, Watercare's commitment to continuous asset planning improvements has ensured their leadership position in water utility asset management in New Zealand.

5.1.2 Asset Related Public Disclosure and Consultation Legislation, New Zealand

The NZ Local Government Act 1974 and amendments (LGA) requires NZ local authorities to prepare long term financial plans (based on asset management plans) and consult with their communities over past performance, management alternatives and best practical options for sustainable management of physical and natural resources. The NZ Electricity (Information Disclosure) Regulations 1999 require electricity network owners to publicly disclose their current asset management plan annually on the Internet.

(a) Best Practices Demonstrated

- Planning Practices : Asset management plan criteria, financial forecasts, performance improvement
- Implementation : Public consultation (asset management plans).

(b) Best Practice Activities

These relate to ensuring that infrastructure network owners employ appropriate management methods and minimize service costs by:

- Preparing an annual plan which includes service performance measures, in consultation with their customers, and reporting annually on actual performance achieved;
- Preparing and adopting a long term financial strategy and identifying significant forecasting assumptions and associated risks;
- Public disclosure of local government and electricity network asset management plans.

(c) Comments

While both public and private sector infrastructure businesses have been required to produce annual financial statements (including statements of financial performance, movements in equity, financial position, cashflows and service performance) new legislation requires consultation over the cost/benefit and risks associated with alternative management options. The long term financial strategy is audited annually in conjunction with other financial statements and must be supported by asset management plans which identify assumptions and improvement programs. The more recent Electricity Disclosure Regulation requirements have adopted the public sector asset management plan model and required public disclosure of management practices to minimize the risk of significant service failures such as the 1997 Central Auckland power failure in New Zealand which extended over a 5 week period.

5.2 Potential Pilot Studies

5.2.1 Current World Bank Strategies in Developing Countries

Improving asset management is particularly relevant to the World Bank's "Urban and Local Government Strategy" which aims to promote sustainable cities which are (i) livable, (ii) competitive, (iii) well governed and managed, and (iv) bankable.

Four main activities are proposed by the World Bank to support this new emphasis:

- Formulation of national urban strategies – helping constituents understand and articulate how the urban transition can contribute to national goals of broad-based growth and poverty reduction, and identifying the economic roles and development requirements of different types of cities within the country.
- Support to city development strategies – facilitating participatory processes by which the local stakeholders define their vision for their city, analyze its economic prospects, and identify priorities for action and for external assistance to implement the strategy.
- Scaling-up programs of services for the poor – including thorough upgrading of low-income urban neighborhoods based on community-based initiatives that are supported by a wide coalition of public and private sector partners.
- Enhanced assistance for capacity-building – supplementing core municipal management operations by supporting intermediary networks, such as municipal associations, as a mechanism for providing technical assistance, training and sharing of experience; and providing direct advisory services outside of lending operations on a variety of urban management issues.

The activities are in addition to the World Bank's core business of urban development including lending and non-lending assistance for municipal management and municipal finance intermediation, housing and real estate market development, urban environment, urban cultural heritage preservation and disaster management.

5.2.2 Barriers to Improving Asset Management

The barriers to successfully implementing asset management improvement strategies in developing countries are:

- Perceived non-priority of specific asset management practices to the particular country or service network;
- Language, culture and education barriers to selling the asset management improvement concept (of developing sustainable physical resources);
- Lack of knowledge, awareness and senior staff acceptance of asset management methodologies and benefits;
- Lack of resources to initiate and implement asset management activities;
- Corrupt and unsound business practices;
- Lack of regulatory requirement or other incentives to undertake asset management planning;
- Difficulty developing a long-term focus or vision when short-term asset development activities and/or crisis management activities are stretching current resources.

5.2.3 Implementation Success Factors

The five key conditions identified to overcome these barriers are outlined below. They are common to both developed and undeveloped countries:

- (i) Structural and supporting legislative reforms that require prudent and sustainable long-term financial planning.
- (ii) Support systems to improve understanding and the ability to quantify the long term benefits of asset management such as:
 - Development of planning guidelines,
 - Training and awareness raising,
 - Development of computerized asset registers and decision making tools.
- (iii) Resources to undertake appropriate asset management planning activities.
- (iv) Effective short-term incentives for achieving asset management improvements (given that the benefits of longer-term planning may take some years to be realized).
- (v) Regular monitoring of asset management performance to ensure improvements are achieved.

All components, except the first, are able to be initiated and controlled by the asset owner, and can therefore be used flexibly within an overall implementation strategy.

The legislative reform component has, however, been crucial in promoting national uniformity, industry co-operation and progress in New Zealand and Australia.

5.2.4 Suggested Implementation Approach

From our assessment of current asset management capability in developing countries and the success factors previously noted, attention must initially be given to:

- Improving skills and awareness (to obtain commitment);
- Establishing achievable improvement objectives;

- Increasing basic asset knowledge (location, condition, performance);
- Preparing basic network asset management plans (to support improvement programs and improved maintenance regimes);
- Developing primary asset information systems.

Figure 5.1 outlines a possible pilot project structure for improving asset management capability in developing countries through:

- Initial awareness raising workshops;
- Capacity building (involving local consultants/counterpart staff in workshops/study tours);
- Preparation of basic asset management plans;
- Consultation/investigation of funding and other incentives to promote sustainable improvement programs;
- Ongoing monitoring and review of improvement programs.

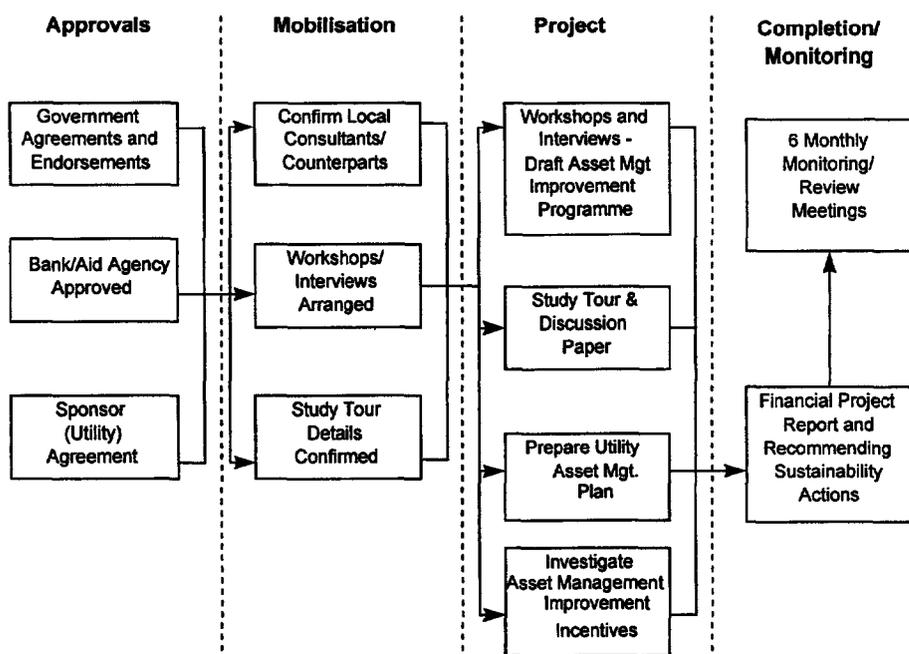


Figure 5.1: Pilot Asset Management Capability Improvement Project

5.2.5 Suggested Pilot Study Locations

Countries and cities that could be potential candidates for pilot studies are listed in Table 5.1. These have been selected from the draft World Bank Urban and Local Government Strategy Report (January 1999) on the basis of them having priority objectives relating to financial management, sustainable infrastructure, and capacity building.

Region	Countries/Cities	Possible Pilot Action
Africa	Uganda, Zimbabwe, South Africa, Ghana	Support capacity building, improved financial management, improved service delivery, greater participation by stakeholders, adequate supply of infrastructure and services.
East Asia and Pacific	Thailand, Philippines, Indonesia, China, Vietnam	Enhance capability of local authorities and water supplies. Support City Development Strategies to showcase reform minded local governments.

Region	Countries/Cities	Possible Pilot Action
Europe and Central Asia	Latvia	Support development of sound municipal financial management (using financial planning supported by asset management plans)

Latin America and Caribbean	Brazil, Columbia, Venezuela, Argentina	Develop asset management plans, standards and guidelines to support appropriate service delivery models and private sector participation in the provision of infrastructure related urban services.
Middle East and North Africa	Lebanon, Bethlehem, West Bank Gaza	Support promotion of sustainable infrastructure and build up municipal management capacity through use of asset management planning models and improvement programs.
South Asia	India (Tamil Nadu), Bangladesh	Use best practice asset management standards, guidelines and models to support urban manager training and improvement of asset management related municipal processes. Provide detailed utility asset management plans to support promotion of private sector investment in urban infrastructure.

Table 5.1: Potential Pilot Cities/Countries

Where improvements are required to asset management planning techniques, the ‘improvement program’ concept (used successfully in Australia and NZ) provides a framework for specifying, promoting and monitoring the managed improvements required.

The ability for municipalities and utilities to demonstrate a structured approach to developing and improving asset management practices will also provide a platform to attract and introduce private sector investment into municipal infrastructure.

6.0 CONCLUSIONS

6.1 Summary

Achieving asset management improvement strategies in developing countries requires the development of a long-term vision for asset management broken down into short-term achievable steps.

In many developing countries the initial focus will be on:

- Developing basic asset inventories;
- Documenting asset operation and maintenance processes;
- Developing primary asset information systems;
- Preparing basic asset management plans;
- Developing skills and raising awareness.

Achieving these initial steps may take some years, and therefore short-term achievable milestones need to be developed, supported by monitoring programs and incentives for achievement.

Experience in developing countries suggests that the key drivers and success factors in improving asset management are:

- Legislative requirements for sustainable financial planning.
- Support systems to improve asset management knowledge and understanding such as :
 - guidelines and standards
 - training and awareness raising
 - computerized asset management information systems.
- A structured improvement plan approach.

In addition to these incentives, lending agencies such as the World Bank are in a position to embed asset management improvements into municipalities by incorporating performance incentives into infrastructure projects.

This involves developing a structured asset management improvement plan, with clear milestones and performance objectives and incentives for achieving these objectives.

The suggested staging for embedding asset management improvements is illustrated in Figure 6.1.

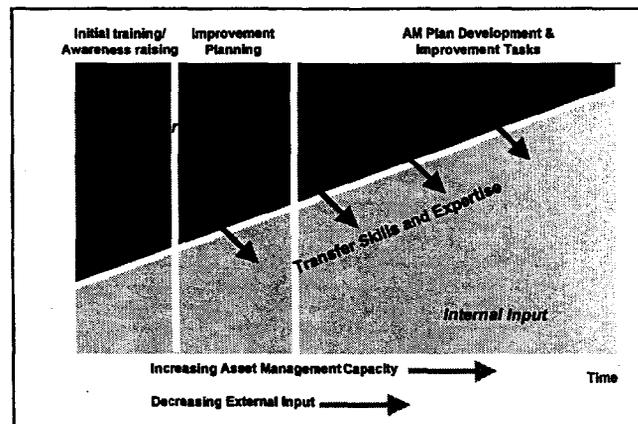


Figure 6.1: Asset Management Capacity Building

The three stages of implementing asset management improvements in a municipality are:

1. Initial training and awareness raising aimed at developing a basic understanding of the concepts and benefits of asset management.
2. Improvement planning with the organization or municipality aimed at setting performance standards, scoping improvement tasks and developing an improvement program.
3. Implementation of improvement tasks and asset management plan development, including monitoring of performance against the original plan.

This approach is also aimed at capacity building by transferring skills over time.

6.2 Key Findings

1. Australia and New Zealand are representative of current world best practice in municipal asset management.
2. New Zealand has the most holistic asset management approach (involving asset management plans and improvement programs) whereas Australia leads advanced asset management techniques and regulatory pricing practices.
3. Legislation and accounting standards have been the key drivers of asset management in developed countries.
4. Consistent national asset management practices have been the single most important factor in strengthening strategic asset and financial management policies in New Zealand and Australia.
5. The asset management planning methodologies and plans used in developed countries are applicable to, and can be adapted for, use in developing countries.
6. Incentives are required to overcome barriers to the successful implementation of improved asset management practices.
7. Embedding asset management improvement targets and performance measures into municipal infrastructure projects may provide the incentive mechanism for effectively improving asset management practices.

REFERENCES AND BIBLIOGRAPHY

Introduction to Asset Management

National Asset Management Steering Group. (1998) *New Zealand Infrastructure Asset Management Manual*. Wellington.

Institute of Municipal Engineering Australia. (1994). *National Asset Management Manual*. Melbourne.

New South Wales Government Public Works Department. (1993). *Total Asset Management Manual*. Sydney.

Burns, Dr. P., Hope, D., Roorda, J. (1998) *Managing Infrastructure for the Next Generation*. Victoria [Online]. Available Internet:

<http://www.localgovt.co.nz/library/ASP/GroupDisplay.asp?GroupID=1&GroupPath=AssetManagement&GroupName=Asset%20Management>

Marshall, K., (1999) *Ownership and management of public water & wastes assets*. [Online]. Available Internet: http://www.localgovtnz.co.nz/MediaRoom/Speeches/water_assets.htm

Australian National Audit Office. (1996). *Better Practice Guide - Asset Management*. Canberra: Author. [Online]. Available Internet: http://www.anao.gov.au/bpg_perf/perfinfo.pdf

Danylo, N.H and Lemer, A., (1998) *Asset Management for the Public Works Manager, Challenges and Strategies*. Findings of the APWA Task Force on Asset Management

Lemer, Andrew C. (1999) Building Public Works Infrastructure Management Systems for Achieving High Return on Public Assets. Public Works Management and Policy, Vol 3 No 3 January 1999.

Australian National Audit Office. (1996). *Asset Management Handbook*. Canberra: Author. [Online]. Available Internet: <http://www.anao.gov.au/bpg/wanao.pdf>
http://www.anao.gov.au/bpg_asstmanhbk/part2bet.html

Hudson, R. A., Hass, R., Uddin, W. (contributor). (1997). *Infrastructure Management: Integrating Design, Construction, Maintenance, Rehabilitation, and Renovation*. New York: McGraw Hill.

Hope, D. (1996, April). Adding value to government assets through better management. *Australian Accountant*, 66, 3, 57-58.

Royal Australian Institute of Public Administration – ACT Division. (1991, July). Asset Management in the public sector: proceedings of the national conference managing Australia's assets. *Canberra Bulletin of Public Administration*, 65, 69-147.

Asset Management Plans

Christchurch City Council. (1998) *Water Supply Asset Management Plan - Executive Summary*. Christchurch: Author [Online]. Available Internet:

<http://www.localgovt.co.nz/library/ASP/DocumentDisplay.asp?Topic=22&Document=CCC+water+exec+summary%2Ehtm&Location=../AssetManagement/>

Gore District Council. (1998) *Gore District Asset Management Plan Asset Group - Parks and Reserves*. Gore: Author. [Online]. Available Internet:

<http://www.localgovt.co.nz/library/ASP/DocumentDisplay.asp?Topic=32&Document=assetmgtplanreserves1998%2Ehtm&Location=../CommunityServices/>

New Plymouth District Council. (1997) *New Plymouth District Libraries Asset Management Plan*. New Plymouth: Author. [Online]. Available Internet:

<http://www.localgovt.co.nz/library/ASP/DocumentDisplay.asp?Topic=29&Document=vupnk0ec%2Ehtm&Location=../CommunityServices/>

Service Levels and Performance Standards

Office of the Auditor General of Canada. (1998). *Developing Performance Measures for Sustainable Development strategies*. [Online]. Available Internet: http://www.oag-bvg.gc.ca/domino/cesd_cedd.nsf/html/pmwork_e.html

Zeithaml, V. A., Parasuraman, A., Berry, L. L. (1989). *Delivering Quality Service- Balancing Customer Perceptions and Expectations*. New York: McMillan.

Condition Assessment & Performance Monitoring

Essex, M., (1998). *Metrowater Asset Criticality Study*. Auckland: Metrowater. [Online]. Available Internet: <http://www.localgovt.co.nz/library/ASP/DocumentDisplay.asp?Topic=23&Document=METROWATER+ASSET+CRITICALITY+STUDY%2Ehtm&Location=../AssetManagement/>

Water Services Association of Australia. (1999). *Australian Water Industry Performance Data*. [Online] Available Internet: <http://www.wsaa.asn.au/facts.html>

Australian National Audit Office. (1997?). *Better Practice Principles for Performance Information*. Canberra: Author. [Online]. Available Internet: http://www.anao.gov.au/bpg_perf/perfinfo.pdf

Australian Productivity Commission. (1997) *Performance Measures for Councils - Improving Local Government Performance Indicators*. Canberra: Author. [Online]. Available Internet: http://www.pc.gov.au/inquiry/localgov/final/chap_3.pdf

Independent Pricing & Regulatory Tribunal of New South Wales. (1998). *Benchmarking Local Government Performance in New South Wales - Final Report*. Sydney: Author. [Online]. Available Internet: <http://www.ipart.nsw.gov.au/pdf/Rev98-1.pdf>

PRAMS Working Group. (1998). *New Zealand Parks and Recreation Asset Condition Grading Standards manual*. Wellington: Author.

NZ Water and Wastes Association. (1995). *Draft Infrastructure Asset Grading Standards*. Auckland: Author.

NZ Water and Wastes Association. (1996). *New Zealand Pipe Inspection Manual*. Auckland: Author.

Risk Assessment & Management

Elms, D. (Ed.) (1998) *Owning the Future – Integrated Risk Management in Practice*. Christchurch: Saxon Print.

Public Works Department (Australia) *Risk Management*. The Association of Risk and Insurance Managers of Australia (Management and Policy Studies Centres, University of Canberra, 1989).

Byrne, R.A., (1996) *Managing Risk in the Life Cycle Process*, Asset Management in the Public Sector Conference, IIR Conferences, Canberra

Demand Management

Franklin, W., Findlayson, G. (1998) *Water Supply Demand Management*. Unpublished Paper. Australia.

Financial Forecasting & Management

Shand, D., (1994). *Financial Management Reforms in Government*. Sydney: In Guthrie, J (ed.) *Making the Australian Public Sector Count in the 1990's* (IRR Conferences, 1995): pp.10-14. (Presentation to IIR Conference on public sector accounting and financial management, Sydney, March 1994).

Burns, P. (1997). Condition-based depreciation for infrastructure assets. In *Readings in Accounting Developments in the Public Sector 1992-93*. (pp.89-104). Adelaide: University of Adelaide.

Hope, D. (1997). Value adding through asset management. In *Readings in Accounting Developments in the Public Sector 1992-93*. (pp.89-104). Adelaide: University of Adelaide.

ACT Energy and Water Charges Commission. (1997) *Investigation into Actew's Electricity, Water & Sewerage Charges for 1997/98*. Canberra. [Online]. Available Internet: <http://www.act.gov.au/government/publications/policies/agreements/97iparc/>

Tasmanian Audit Office. (1998). *Auditor-General Special Report No 26 Capitalization and Reporting of Rooding Assets in Tasmania*. Hobart: Government Printer, Tasmania. [Online]. Available Internet: <http://www.audit.tas.gov.au/reports/1998/TAOrep26.pdf>

Asset Management Implementation Tactics

Office of the Auditor General. (1997) *Report of the Controller and Auditor General on Contracting for Maintenance Services in Local Government*. Wellington: Government Printer.

Asset Identification and Classification

Association of Local Government Engineers N.Z. (1995) *Pipeline Asset Numbering Guidelines*. Wellington: Author.

Asset Management Information Systems

Hansen Information Technologies Inc. (1999). *About Hansen Information Management Systems*. [Online]. Available Internet: <http://www.hansen.com/about/about.htm>

Southbank Systems PLC. (1999) *About CONFIRM*. [Online]. Available Internet: <http://www.sbs-plc.co.uk/products.htm>

Koniditsiotis, C. (1994). *Evaluation of the Road Assessment and Maintenance Management System – RAMM*. Australian Road Research Board Ltd. Research Report ARR 250.

Gordon, M. (1998). *Rooding Information Management System Project*. Wellington. Author. [Online]. Available Internet: <http://www.localgovt.co.nz/library/ASP/DocumentDisplay.asp?Topic=21&Document=Transit+letter+6%2D98%2Ehtm&Location=../AssetManagement/>

Gordon, M., (1998) *Rooding Information Management System Project Update*. Wellington. Author. [Online]. Available Internet: <http://www.localgovt.co.nz/library/ASP/DocumentDisplay.asp?Topic=21&Document=TLAs+letter+6%2D98%2Ehtm&Location=../AssetManagement/>

Local Issues, Regulatory Requirements and Standards

Australia

Joint Committee of Public Accounts and Audit. (1998). *Report 363, Asset Management by Commonwealth Agencies*. Canberra: Commonwealth of Australia. [Online]. Available Internet: <http://www.aph.gov.au/house/committe/jpaa/assets/report/contents.htm>

New South Wales, Public Works Department, Policy Division. (1993) *Total Asset Management Manual*. Sydney: NSW Government.

New South Wales, Construction policy Steering Committee. (1993) *Capital Project Procurement Manual*. Sydney: NSW Government.

Australian Capital Territory. (1999). *Draft Outline of ACT Utilities Regulatory Regime*. Canberra. [Online]. Available Internet: <http://www.act.gov.au/government/actewss/ur/OUTLINE1.html>

Victoria, Local Government Industry Working Party. (1994) *Compulsory Competitive Tendering Procedures Manual*. Melbourne: Institute of Municipal Management.

Victoria, Office of Local Government Victoria, (1992) *Asset Accounting Manual*. Melbourne: Institute of Municipal Management.

Steering Committee on National Performance Monitoring of Government Trading Enterprises *Guidelines on Accounting Policy for Valuation of Assets of Government Trading Enterprises - Using Current Valuation Methods* (1994), Industry Commission, Melbourne.

New Zealand

Office of the Controller and Auditor general of New Zealand. (1998). *Developments in Accountability and Auditing*. Wellington: Author. [Online]. Available Internet: [http://www.netlink.co.nz/~oag/DiscussionPapers/SPASI Paper Accountability & Auditing.htm](http://www.netlink.co.nz/~oag/DiscussionPapers/SPASI_Paper_Accountability_&_Auditing.htm)

Local Government New Zealand. (1999). *Streets Ahead – Local Government New Zealand Response to 'Better Transport, Better Roads'*. Wellington: Author. [Online]. Available Internet: <http://www.localgovtnz.co.nz/Library/submissions&reports/Street Ahead.htm>

Accounting Standards

Australia

Australian Society of Chartered Practice Accountants. (1997). *AAS 4 Depreciation of Non Current assets*. Melbourne: Australian Accounting Research Foundation.

Australian Society of Chartered Practice Accountants. (1995). *AAS 10 Accounting for the Revaluation of Non-Current Assets*. Melbourne: Australian Accounting Research Foundation.

Australian Society of Chartered Practice Accountants. (1996). *AAS 27 Financial Reporting by Local Governments*. Melbourne: Australian Accounting Research Foundation.

Australian Society of Chartered Practice Accountants. (1997). *AAS 28 Statement of Cash Flows*. Melbourne: Australian Accounting Research Foundation.

Australian Accounting Standards, AAS27 “*Financial Reporting by Local Governments*” plus others

New Zealand

New Zealand Society of Accountants. (1984). *SSAP-3 Accounting for Depreciation*. Wellington: Author

New Zealand Society of Accountants. (1991). *SSAP-28 Accounting for Fixed Assets*. Wellington: Author

New Zealand Society of Accountants. (1992). *New Zealand Accounting Standards – January 1992*. Wellington: Hutcheson, Bowman and Stewart.

Institute of Chartered Accountants of New Zealand. (1998). *Exposure Draft ED-82 & Discussion Paper*. Wellington: Institute of Chartered Accountants of New Zealand.

Electricity (Information Disclosure) Regulations 1999. (1999). Wellington: Government Printer.

Kirkpatrick, D. (1999). *The commercialization of Infrastructure Assets, Managing the Transition to the New Rooding Regime. How will the new environment be regulated?* Unpublished Paper, Institute for International Research Conference, March 1999.

Horsley, G. (1994). *Valuing Infrastructural Assets in the Public Sector*. Unpublished Paper, Public Sector Property Management Conference, April 1994.

Valuation

New South Wales Independent Pricing & Regulatory Tribunal; Choy, Elsie, Reid, Colin, Balding, Russell. (1996). *Asset Valuation by government trading enterprises: bibliography*. Melbourne. Australian Society of Chartered Practice Accountants, Public Sector Accounting Centre of Excellence.

Australian Productivity Commission. (1994). *Guidelines on accounting policy for valuation of assets of Government Trading Enterprises*. Canberra: Author. [Online]. Available Internet: <http://www.pc.gov.au/service/gte/deprival/index.html>

Auditing

South Australian Commission of Audit (1994) *Report of the South Australian Commission of Audit: Charting the Way Forward, Improving Public Sector Performance*, Adelaide.

Byrne, R.A., (1997) *Auditing the Management of the Physical Infrastructure That Supports Your Productive Environment, Institute of Internal Auditors - Australia*, The IIA- Australia South Pacific and Asia Conference, 21 May 1997, Sydney

Byrne, R.A., (1997) *Best Practice in Auditing the Management of the Physical Infrastructure*, Internal Audit Conference, 9 June 1997, Singapore

General

Bray, D., & Tisato, P. (1998) Broadening the debate on road pricing. *Road & Transport Research*, 7, 34-45.

Day, A. (1998) Meeting the needs of the community: social issues in road and transport planning. *Road & Transport Research*, 7, 64-74.

Lang, T. (1999) Alternative ways to measure progress: how new indicators will impact on road management. *Road & Transport Research*, 7, 68-83.

Productivity Commission (Australia). (1998). *Performance of Government Trading Enterprises 1991-92 to 1996-97*. Canberra: Author. [Online]. Available Internet: <http://www.pc.gov.au/service/gte/perf9697/perf9697.zip>

Independent Pricing & Regulatory Tribunal of New South Wales. (1999). *Efficiency and benchmarking study of the NSW distribution business – Research Paper No. 13*. Sydney: Author. [Online]. Available Internet: <http://www.ipart.nsw.gov.au/pdf/Rp13.pdf>, <http://www.ipart.nsw.gov.au/pdf/Rp13-A1.pdf>, <http://www.ipart.nsw.gov.au/pdf/Rp13-A3.pdf>

Independent Pricing & Regulatory Tribunal of New South Wales. (1999). *Efficiency and benchmarking of NSW electricity distributors– Discussion Paper DP 33*. Sydney: Author. [Online]. Available Internet: <http://www.ipart.nsw.gov.au/pdf/Dp33.pdf>

Independent Pricing & Regulatory Tribunal of New South Wales. (1999). *Rolling forward the regulatory asset bases of the electricity and gas industries.– Discussion Paper DP 31*. Sydney: Author. [Online]. Available Internet: <http://www.ipart.nsw.gov.au/pdf/Dp31.pdf>

Independent Pricing & Regulatory Tribunal of New South Wales. (1999). *Summary Report of 1998 Distribution Benchmarking - Research Paper - UMS Group.– Research Paper No.14.* Sydney: Author. [Online]. Available Internet: <http://www.ipart.nsw.gov.au/pdf/Rp14.pdf>

National Research Council (U.S.) (1995) *Measuring and Improving Infrastructure Performance*, Committee on Measuring and Improving Infrastructure Performance. National Academy Press.

Ben-Akiva, Moshe and Ramaswamy, Rohit (1993). *Approach for Predicting Latent Infrastructure Facility Deterioration*, Transportation Science Vol. 27 n 2 (May): 174-193

National Research Council (U.S.) Committee on Measuring and Improving Infrastructure Performance (1995). *“Measuring and Improving Infrastructure Performance,”* National Academy Press.

Lu, Y (1993). *A Methodology for Updating Deterioration Models in Infrastructure Management*, Thesis (MSE) Purdue University.

McCleese W. (1986). *Corps of Engineers’ Repair, Evaluation, Maintenance and Rehabilitation (REMR) Research Program*, Proceedings of the American Power Conference: Chicago, IL (April 14-16) Vol. 48, American Power Conference Illinois Institute of Technology: 1114-1117.

Brown, M and Kraft, W. (1985). *Rebuilding America: Infrastructure Rehabilitation: Proceedings of a Conference Sponsored by the Metropolitan Association of Urban Designers and Environmental Planners.*



The World Bank
Urban Development

1818 H Street, NW
Washington, DC 20433
USA

Internet: www.worldbank.org/urban