THE BEACH IMPROVEMENT PROGRAMME : NEW SOUTH WALES

Neale A. Philip and Philip H. Whaite[1].

1. INTRODUCTION

The Coastal Engineering Branch of the Public Works Department N.S.W administers the Beach Improvement Programme, a programme of works with an average annual expenditure of one million dollars, for the improvement of the State's public recreational beach amenities.

Priority is given to beaches with highest usage, resulting in the first two years' funds being allocated to the densely populated coastal strip between Newcastle and Wollongong.

Priority is also assigned to various types of works:-

1. Preservation, conservation or restoration of the beach itself by sand nourishment, dune stabilisation, seawall demolition;

2. Erosion control where appropriate, by seawall and revetment construction and land acquisition;

3. Provision of facilities such as car parks, access roads, dressing sheds and toilet blocks;

4. Beautification such as grassing and tree planting.

The near city beaches in Sydney, Newcastle and Wollongong have mostly been fully developed with seawalls and promenades behind the beach berm, while in outer Metropolitan areas, the beaches have been left in a more natural state, with some development such as car parks and dressing pavillions on or behind the sand dunes.

2. BACKGROUND

The New South Wales coastline experiences the highest recreational pressures on it of all Australian States. With the shortest coastline length and the highest population this pressure is overwhelming by Australian standards.

1. The Authors are Engineers in the Coastal Engineering Branch of the Public Works Department, New South Wales.

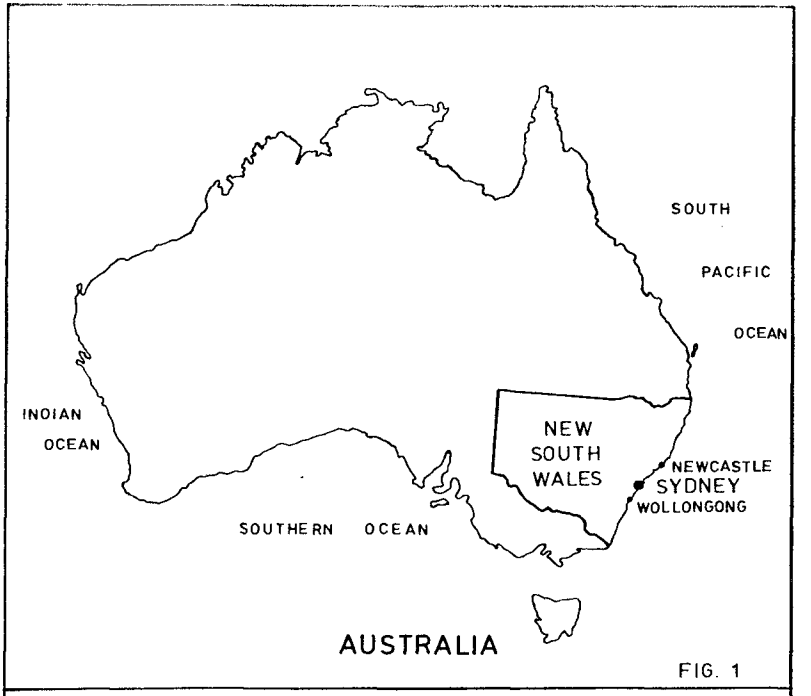
SOUTH
PACIFIC
OCEAN
INDIAN
OCEAN
NEW
SOUTH
WALES
NEWCASTLE
SYDNEY
WOLLONGONG
SOUTHERN OCEAN
AUSTRALIA

FIG. 1

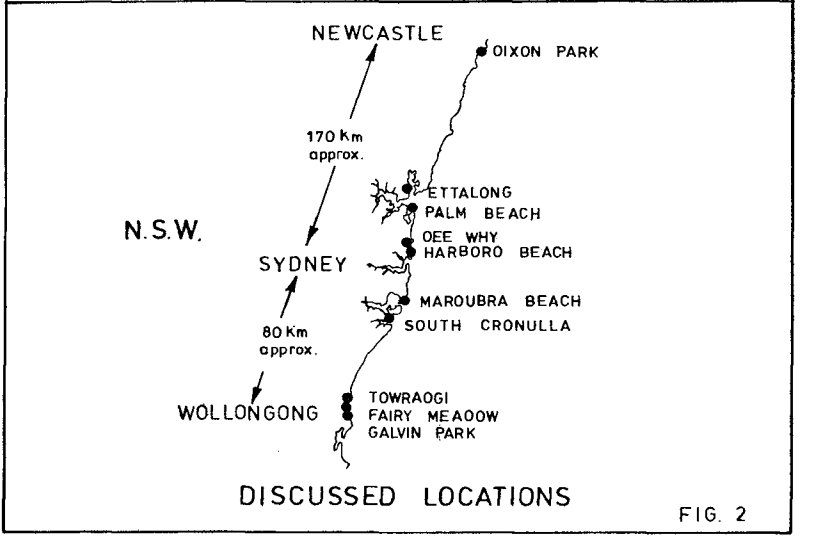
NEWCASTLE
DIXON PARK
170 Km
approx.
ETTALONG
PALM BEACH
N.S.W.
DEE WHY
HARBORO BEACH
SYDNEY
MAROUBRA BEACH
SOUTH CRONULLA
80 Km
approx.
WOLLONGONG
TOWRAOGI
FAIRY MEADOW
GALVIN PARK
DISCUSSED LOCATIONS

FIG. 2

Given this high potential demand on the recreational resources of the New South Wales coast and the later documented evidence confirming the suspicion that the New South Wales coastline is receding, the State Government, four years ago, introduced the Beach Improvement Programme.

3. BEACH USAGE

Although it is obvious that the population density along the New South Wales coast is low when compared to the European or U.S. situation, usage of beaches for recreation is encouraged by the climate, the availability of the free beach resource and the high mobility of the community.

A study of the accessibility of beaches to the population of the Sydney region (approximately 2.8 million in 1976) (Whaite, 1979) provides a measure of the potential customers for beach usage in that region. This study utilised travel times from the Sydney Area Transportation Study (1974) and Australian Bureau of Statistics population data (1977).

Table 1 indicates how close the regions population is to an ocean beach.

TABLE 1 : MINIMUM TRAVEL TIMES TO A SYDNEY BEACH FOR PERCENTAGE OF REGIONS POPULATION

Travel times (mins.)	30	60	120
Percentage of population taking less than travel time	21	59	97

A more detailed study at a relatively inaccessible beach in the region (Palm Beach) reveals that 72% of all users at this beach come from local government areas which are not coastal and that only 13% of users are local residents. It is also interesting to note that 5% of users travel for more than two hours. This fact is related to the particularly scenic location of this beach.

This example illustrates how local government Councils have beaches accessible to large populations from outside their areas of responsibility. Local government is responsible for the upkeep of the beaches. The need for some State involvement in improvement work at beaches with high usage is apparent. Thus the Beach Improvement Programme, by offering grants to local government for beach works, has helped to distribute the burden of upkeep of this valued recreational resource.

4. PROGRAMME MANAGEMENT

Expert technical input to investigation and/or design of projects can come from the Department, the State Soil Conservation Service or consultants. The Department provides coastal engineering and/or landscape architectural expertise, the Soil Conservation Service provides dune stabilisation expertise, and the consultants, where used, provide coastal and structural design or architectural expertise.

Local councils initiate proposals and carry out the works. In an advisory capacity at the proposal stage, the Department has conducted a number of beach management studies in which a beach system has been examined, overall beach management strategies have been formulated and improvement works recommended.

5. MANAGEMENT STUDIES

5.1 Dee Why Study

In 1977 the Department carried out a proto-type Coastal Management Study at Dee Why, a beach situated in Sydney's northern beach region. The Dee Why area was an ovvious choice for a proto-type study as a large amount of research into the local coastal system was available from studies undertaken by various government authorities and the three Universities in Sydney.

The area is interesting for study purposes as it consists of a lagoon/beach system which is relatively common along the New South Wales coast. Further, the area is surrounded by urban development and the resulting pressures of human activity highlight the need to develop appropriate management strategies.

The management study proposed a number of alternative strategies, namely:

1. 'No Nothing' Strategy
2. Minimum Management Strategy
3. Desirable Management Strategy
4. Back to Nature Strategy

The Beach Improvement Programme has funded works which are contained in the Desirable Management Strategy. The works include dune stabilisation and reno-mattress training works at the lagoon entrance designed to stabilise the lagoon breakout zone.

This is an example of how the Beach Improvement Programme by providing financial incentives, has encouraged local councils to consider various management options available for coastal areas and make decisions that will improve an area's capacity to withstand future usage and natural forces.

5.2 Maroubra Beach Management Study

The Maroubra Beach Management Study (D.P.W., 1978) employed the combined expertise of coastal engineers and landscape architects from the Department, and consultant architects.

During the study, interviews were held with all authorities having an involvement with the beach and with members of the public who use the beach. These interviews, subsequently interpreted by the varied expertise possessed by the study personnel, and combined with the latter's observations, identified a number of problems existing at the beach and works solutions were recommended where appropriate.

The major recommendations were :-

- revised landscaped parking scheme and new landscaped area linking the major beach buildings

- the reconstruction of the existing pavilion to house a kiosk, new change rooms and beach inspectors room and paved terrace areas

- stabilisation of dune system with a programme of fenced plantings and access ways over an area measuring 50 metres wide by 400 metres long.

Many aspects were examined to reach appropriate conclusions regarding management of the beach and recommendations on improvement works. Aspects studied included beach behaviour, beach management, visual character, parking and general access, vegetation and services proved to the public.

The dune stabilisation recommendation has been implemented and landscaping work will commence shortly.

6. PROJECTS

6.1 Dixon Park Project

Dixon Park Beach (D.P.W., 1978) is part of a small embayment approximately 1 kilometre long, bounded by a minor headland to the north and a headland to the south.

The objectives of the project were as follows:-

(i) Restoration of the beach amenity in the form of a large beach area.

(ii) Erosion control in the form of revetment construction.

(iii) Improved access by way of steps, paths and boat ramp.

(iv) Provision of amenities such as picnic area.

(v) Beautification such as grassing, shrubbery and aesthetic restoration.

The design of the revetment used the basic Hudson's formula approach but the usual secondary under layer of rock was not used as the slag fill behind contained material of this size. This also reduced the number of steps required in the construction procedure. The armour stone was keyed into firm material at the toe.

6.2 Beach Nourishment Projects

The programme has been and is currently involved in a number of beach nourishment projects.

Nourishment of South Cronulla Beach, the most southerly major beach in the Sydney region (Foster, Gordon, 1978) involved the placing of some 130,000 cubic metres of sand onto the beach berm in two stages commencing in July 1977 over 3 months and agin in May 1978 over a further 3 months period. The local Council undertook the work which involved trucking from the sand source, a major transgressive dune system some three kilometres north of the beach.

Another beach nourishment project currently in progress is at Ettalong Beach an estuarine beach north of Sydney. Delay of commencement to that project was necessary to avoid interference with summer holiday recreational activities. This project is a consequence of a Departmental Report (Ray, Hoffman, 1978) which proposed so called 'soft' management techniques to restore 'natural' sand circulation in the estuary. The borrow area is a shoal within the estuary and a dredge is being utilised to move some 60,000 cubic metres of sand to nourish the beach and nearshore channel.

In both the above projects monitoring programmes are being undertaken to gauge the success of the works and provide information for any future works of this nature in both ocean and estuarine environments in in general and of the needs for periodic nourishment in the actual works location.

6.3 Wollongong Region Projects

A beach system where a number of works have been constructed is situated near Wollongong.

Terminal revetments have been constructed at Towradgi and Galvin Park to protect recreational amenities at each end of the embayment, and in between dune stabilisation is under construction from Fairymeadow to Towradgi.

The terminal revetment at Towradgi and Galvin Park are of Reno mattress construction, and as such are world leaders in the application of this structure in a wave climate as severe as is experienced on this section of the Australian coast.

Mattresses were selected both for economic reasons, and as a trail structure to assess their effectiveness. Aesthetic treatment of the revetment has been provided by sand cover planted with marram grass. Board and chain walkways provide access over the structure onto the beach.

Along the shoreline between these two structures, is several kilometres of dune stabilisation work. Where necessary, sand in the hind dune area has been excavated and placed in the frontal dune area to rebuild a continuous and effective frontal dune system.

To reduce costs, marram grass has been planted by mechanised methods, and the entire frontal dune area has been fenced, with access ways at appropriate locations.

6.4 Eastern Suburbs Beaches

Beaches in Sydney's eastern suburbs (the coastline from Sydney Harbour to Botany Bay), surrounded by urban developments, attract high user concentrations. The beach accessibility study (Whaite 1979), showed that these beaches are the most accessible to the greater proportion of Sydney's population.

The involvement of the Beach Improvement Programme in this region to date has been in the form of landscaping and beautification such as the financing of retaining walls, turfing, shrub plantings and irrigation systems. Landscape architecture input has been used to guarantee high aesthetic standards and to ensure slection of plant species tolerant to the harsh foreshore climate.

6.5 Harbord Project

Harbord Beach on Sydney's northern beach region provides an example of how the Beach Improvement Programme has funded a variety of works at one site. The original proposal from the local council formed the basis for discussions between council staff, the State soil conservationists and Public Works' coastal engineers and landscape architects. The resulting final design represents a major change in the previously degraded character of the beach and surrounding area.

The works have rebuilt sand dunes, re-organised parking by providing limited asphalt spaces with grassed overflow areas and have diverted drainage lines.

Although this beach was not subject to a formal Beach Management Study, the multi-disciplinary approach produced the integrated nature of the components which constituted the final design. Major schemes of this nature, or works forming part of a major scheme are proving to be the most successful projects in improving the beach amenity.

6.6 Cost of Works

Table 2 summarises the costs of a number of works discussed. A cost of works per metre of coast is included to enable some comparison between the different types of works.

TABLE 2 : BEACH IMPROVEMENT WORKS : COST COMPARISONS

Project Location	Type of Work	Total Cost A$(x 1000)	Cost per Metre (A$/m)
Dixon Park	Rubble revetment	275	1100
South Cronulla	Sand nourishment	250	600
Towradgi and Galvin Park	Reno-mattress revetment	350	800
Fairymeadow/ Towradgi	Dune reshaping and stabilisation	100	75
Maroubra	Dune stabilisation	60	100
Harbord	Dune re-building and stabilisation	60	200

7. CONCLUSIONS

In the four years since the commencement of the Beach Improvement Programme works at over thirty sites have been undertaken. A trend has developed towards a total scheme concept where beach preservation/ restoration works, such as dune stabilisation or beach nourishment, are complemented by provision of back beach amenties, such as landscaped and car parks areas. The use of management studies to define management options, utilising knowledge of the local coastal system, has proved of great benefit by providing a basis for discussion concerning an area's possible development which ultimately results in preparation of beach improvement proposals suiting their environment and acceptable to the public.

8. REFERENCES

1. WHAITE P.H.
ACCESSIBILITY OF BEACHES IN SYDNEY - Survey of beach users
Part of requirements for M. Eng. Sc. degree from University of N.S.W. 1979

2. Coastal Engineering Branch - Department of Public Works, N.S.W.
DEE WHY LAGOON - MANAGEMENT STUDY
November 1977

3. Department of Public Works, N.S.W.
MAROUBRA BEACH MANAGEMENT STUDY
Report No. 78030, September 1978.

4. Department of Public Works - Newcastle District Office
DIXON PARK - CONSTRUCTION REPORT
September 1978

REFERENCES Cont.

5. FOSTER D.N. and A.D. GORDON
BEACH PROTECTION, CRONULLA
Fourth Australian Conference on Coastal and Ocean Engineering, November 1978.

6. RAY, N.S.W. and J.G. HOFFMAN
ETTALONG BEACH EROSION STUDY AND MANAGEMENT PROGRAMME
Fourth Australian Conference on Coastal and Ocean Engineering, November 1978.