

Engineering News



A QUARTERLY JOURNAL OF THE PAKISTAN ENGINEERING CONGRESS

66th CONVENTION ISSUE



PAKISTAN ENGINEERING CONGRESS

THE EXECUTIVE COUNCIL FOR THE 66TH SESSION (1994-95)

PRESIDENT

ENGR. MAZHAR ALI

VICE PRESIDENTS

1. Engr. Ehsan Ullah Sardar
2. Engr. Khalid Latif Khawaja
3. Engr. Ashfaq A. Kureshi
4. Engr. Dr. Ikram-ul-Haq Dar
5. Engr. Mrs. Naheed Ghazanfar

6. Engr. Ch. Ikram-ullah
7. Engr. Abdul Khaliq Khan
8. Engr. Javed Ahmad Malik
9. Engr. Zafar-ullah Khan
10. Engr. Syed Akhtar Ali Shah

11. Engr. Khalid Habib
12. Engr. Muhammad Rafiq Shad.
13. Engr. A. R. Memon
14. Engr. Abdur Razik Khan
15. Engr. Fateh-ullah Khan

OFFICE BEARERS

1. Engr. Dr. Izhar-ul-Haq	.....	Secretary
2. Engr. Capt. (R) Muhammad Qadir Khan	.....	Joint Secretary
3. Engr. Iftikhar-ul-Haq	.....	Treasurer
4. Engr. Mian Mazhar-ul-Haque	.....	Publicity Secretary
5. Engr. Rana Muhammad Saeed Ahmad Khan	.....	Business Manager
6. Engr. Sh. Nisar-ul-Haque	.....	Chief Editor, Engg. News Journal

EXECUTIVE COUNCIL MEMBERS

1. Engr. Rana Allah Dad Khan
(Immediate Past President)
2. Engr. Ikram-ul-Haq
3. Engr. Ch. Haider Ali
4. Engr. Syed Ali Gohar Shah
5. Engr. Muhammad Nijat Khan
6. Engr. Ch. Muhammad Amin
7. Engr. Mian Abdul Ghaffar
8. Engr. Dr. Bagh Ali Shahid
9. Engr. S.M.A. Zaidi
10. Engr. Rashid A. Chaudhry
11. Engr. Karim Bakhsh Nasir
12. Engr. Ch. Muhammad Munir
13. Engr. Ch. Abdul Khaliq

14. Engr. Riaz Ahmed Khan
15. Engr. Abdul Hamid Arif.
16. Engr. Tahir Ahmad Malik
17. Engr. Safdar Hussain Khan
18. Engr. Sultan Ali Barq
19. Engr. Zubair M. Pirzada
20. Engr. Nisar Ahmad Malik
21. Engr. M.L. Hussain Tariq
22. Engr. Ch. Muhammad Ashraf
23. Engr. M. Javed Iqbal Malik
24. Engr. Tahir Anjum Qureshi
25. Engr. Usman Akram
26. Engr. Shafaat Ahmad Qureshi
27. Engr. A.H. Zaidi

28. Engr. S.N.H. Mashhadi
29. Engr. Ch. Muhammad Azam
30. Engr. C.M. Ashraf
31. Engr. M.S. Khan
32. Engr. S.A.K. Niazi
33. Engr. E.I. Johri
34. Engr. Prof. Syed Ali Rizwan
35. Engr. Sabir Khan Sadozai
36. Engr. Nazar Muhammad Malik
37. Engr. M.M. Khan
38. Engr. Karamat-ullah Chaudry
39. Engr. Mian Muhammad Sharif
40. Engr. Mian Muhammad Ashraf

TITLE PAGE PHOTOGRAPH

President PEC giving a plaque to Sardar Maqsood Ahmad Khan Leghari, Minister for Irrigation and Power Punjab at a Seminar on Management of Hill Torrents held by Multan Centre of PEC.

THIRTY EIGHTH YEAR OF PUBLICATION
ENGINEERING NEWS

Quarterly Journal of the Pakistan Engineering Congress

Vol. XXXX Oct - Dec 95, Jan - March 96 No. 4 & 5

@
@
@
@
@
@
@
@
@
@
@
@
@
@
@
@
@
@
@
@
@

BOARD OF EDITORS

66th Session 94-95

CHIEF EDITOR

Engr. Sh. Nisar ul Haque

EDITORS

Engr. S.N.H. Mashhadi
 Engr. Mian Fazal Ahmad
 Engr. Maqbul Ahmad Siddiqui
 Engr. Javaid Akhtar
 Engr. Cap (Rt) M. Qadir Khan

@
@
@
@
@
@
@
@
@
@
@
@
@
@
@
@
@
@
@
@
@

Published by
 Pakistan Engineering Congress

FOR MEMBERS ONLY

ON	OTHER	PAGES
In this issue		3
EDITORIAL		
Corruption, Corruption, all the way!		4
SEMINARS		
International Symposium on Management of Hill Torrents in Pakistan.		6
TECHNICAL PAPERS		
O	Waters for Peace in West Asia-A Role for Pakistan. <i>Engr. Mohiuddin Khan</i>	18
O	Main Issues in Low Income Housing Project and possible role of National Housing Authority in Pakistan. <i>Engr. Nazir Ahmed</i>	28
O	Modern Industrial Concepts <i>Engr. J.K. Jaffari</i>	35
O	Pollution Load from Urban Runoff; <i>Engr. Awais Latif Piracha.</i>	39
REPORTAGE		
O	Punjab Irrigation Department that was. <i>Engr. Khalid Faruq.</i>	48
FORUM		
O	Pakistan at the Threshold of a Vital Decision.	51
O	Letters to Editor	60
IN THE NEWS		
O	Seminar on Kalabagh Dam	64
O	PEC Brief Chief Minister Punjab on Kalabagh Dam	
O	PEC holds Press Conference on Privatization of Irrigation Waters	66
O	Letters a - glori	
O	PEC Supports Engineers Demands.	
PROFILE		
O	Engr. Shah Nawaz Khan	67

- ⇒ ALL COMMUNICATIONS SHOULD BE ADDRESSED TO THE CHIEF EDITOR, ENGINEERING NEWS PEC BUILDING, LIBERTY MARKET, GULBERG-III, LAHORE.
- ⇒ FREE TO MEMBERS OF PAKISTAN ENGINEERING CONGRESS.
- ⇒ ANY CHANGE OF ADDRESS SHOULD BE PROMPTLY INTIMATED GIVING OLD AS WELL AS NEW ADDRESS ALONG WITH MEMBERSHIP NUMBER.
- ⇒ CONTRIBUTION TO THIS JOURNAL IN THE FORM OF ARTICLES, NEWS ABOUT ENGINEERING WORKS, NEWS ABOUT ENGINEERS, PHOTOGRAPHS AND TECHNICAL DATA ETC. ARE CORDIALLY INVITED.
- ⇒ REPRINTS FROM THIS JOURNAL BE MADE ON THE CONDITION THAT REFERENCE IS GIVEN TO THE ENGINEERING NEWS, ITS VOL. NO. AND THE AUTHOR.
- ⇒ PAKISTAN ENGINEERING CONGRESS IS NOT RESPONSIBLE FOR ANY STATEMENTS MADE OR OPINIONS EXPRESSED IN THIS JOURNAL.

IN THIS ISSUE

This is a double issue. We were hoping to take out this issue at the time of the 67th Annual Session, but unfortunately the Session has been delayed and so has been this issue. We offer sincerest apologies to our readers.

Water has been drawing attention every where. Water is life and its economical use is essential for survival of life of humanity. It is even more so in a country like Pakistan which depends for its food and fibre on the River Indus. Engr. Mohiuddin Khan has given a picture of water disputes in the Middle East. See page.18

Control of flood water of hill torrents was the

subject of a Seminar held by PEC Centre Multan. It is reported on pages.

Another Issue is management and distribution of irrigation water. Engr. Khalid Farooq has related the history of Irrigation Department which has been responsible for managing irrigation systems of the Punjab.

We have received some excellent technical papers which are given on page 18-47.

In the Forum, we produce a paper sent to us by President Overseas Chamber of Commerce and Industry, giving his vision of Pakistan in the year 2000. OCCI would like to share his vision with

us and get Engineers views. I hope our readers will send their reaction to us.

Engr. Shah Nawaz Khan is subject of profile in this issue. Engr. Shah Nawaz Khan needs no Introduction. His advice and view based on years of practical experience should provide guidance to many of us.

As usual our readers have sent letters showing their reaction and views. Dr. Yaqoob Bhatti is waging a single hand crusade for Kalabagh Dam. He has written over 70 letters to the newspapers. A montage appears on page 78-79 showing some of these letters.



Corruption, Corruption all the Way!

Pakistan's budget for 1996-97 was 'read' in the Parliament and passed in a day, as the opposition had staged a walk out. The Rs. 500 billion budget shows a deficit of Rs. 120 billion which is to be met by taxes, (41 billion) borrowing from the banks, (20 billion) from publishing new currency notes and foreign loans. As usual there is hue and cry from all sides.

The budget has been described as anti-growth and anti-business by FPCCI. It has also been called as inequitable as it calls for sacrifices by the people with no corresponding contribution of the rulers. Some have called it jugglery of figures as it will not meet any targets of reducing budget deficit from 4 percent (from 5-6 this year), inflation to 8% (current 13%) increase GDP growth rate to 6.3% and trade deficit to 2 billion (from 3 billion at present).

The question every one is asking how long will this state of affairs go on. Is there any alternative to the IMF designed budget and the conditions attached to it?

The malady is not new. It has been there for over thirty years. Ever since Pakistan adopted Howard School model of economic development with its basic concept of borrowing from IMF & IBRD. It was not difficult to foresee and engineers have been pointing to the danger of borrowing recklessly. But it was difficult to change the course. The will and faith required to do so way not there. It is high time that we realize that a change is imperative and further delay will mean disaster for Pakistan and its people.

There is a general consensus in the country that corruption is the main factor in the situation Pakistan finds itself. Corruption eats away over Rs. 40 billion of our economy, if we could stop this we could dispense with crutches of aid and thus dependence of IMF. Corruption also leads to misdirection of our resources into non-productive channels. Corruption also leads to extravagance and conspicuous consumption reducing savings which could be diverted into productive channels. Above all it eats at the vitals of our moral and spiritual values. If we can stop corruption we could remedy most of the ills of our body politics.

As engineers, we can play a leading role in eradication of corruption. Over 60% of the development expenditure passes through engineers hands. If this expenditure is corruption free, the saving can go a long way in reducing the deficit.

It is the professional duty of an engineer to get maximum results with minimum resources. The economy of expenditure is engrained in all engineering endeavours. By economy in expenditure engineers can help a lot.

Engineers are producers of national wealth, better use of factor of production can lead to greater productivity and development basically is increasing productivity. This is the major factor that distinguishes developed from developing countries. Engineers can, therefore, play pivotal role in increasing productivity and national wealth.

So let the eradication of corruption, economy of expenditure and increasing productivity be the new motto of the engineering profession.

Late Prime Minister Z. A. Bhutto told engineers at an Engineers Convention that engineers were agents of change. Let's as engineer play our role and give the nation a lead and be "avante garde" of a new revolution.



There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune;
Omitted, all the voyage of their life
Is bound in shallows and in miseries.
On such a full sea are we now afloat;
And we must take the current when it serves,
Or lose our ventures.

International Symposium on Management of Hill Torrents in Pakistan.

The Multan Centre of Pakistan Engineering Congress held a Symposium on "Management of Hill Torrents" on 17th Jan. 1996. The Symposium was inaugurated by the Punjab Minister of Irrigation & Power. Address of Welcome was presented by Engr. S.M.A. Zaidi. A large number of Engineers, individuals, Public men attended the Symposium. We present here the welcome addresses, Presidential address, the Inaugural address and Synopsis of papers etc.

Welcoming Syed Mansoob Ali Zadi, Chairman Multan Center P.E.C said:

Honourable Chief Guest Sardar Maqsood Ahmad Khan Leghari Minister for Irrigation and Power Department, President Engineering Congress, distinguished guests and delegates, Assalam-o-Alaikum!

This symposium has been arranged in response to a call by our chief guest Sardar Maqsood Ahmad Khan Leghari, Minister for Irrigation and Power Punjab during his Inaugural Address for the last symposium on Flood Management. In his opening address, the worthy Minister stressed the need for an exclusive Technical Session of Engineers and Scientists to discuss and deliberate on the Management of Hill Torrents and propose ways

and means for their harnessing.

The Hill Torrents are streams characterized by steep gradients, high velocities and flashy flows with heavy sediment charge. Hill Torrents in Pakistan generally originate from the northern and western Hindukush and Suleman mountain ranges, as well as, from Kirther and Mekran Coast hill range. The flashy floods of hill torrents cause colossal damages to the crops, irrigation and communication network, human life and property. Hill torrents flooding also poses serious environmental and economic hazards. The flood flows after debouching from the Hills spread over large areas, and stagnate there for long

periods, preventing cultivation and causing waterlogging and salinity.

Harnessing Hill Torrent flows can play a pivotal role for socio-economic uplift of the less developed areas of the country. Management of flood flows would provide reliable source of irrigation and would greatly enhance the living standards of local people, whose majority lives below the absolute poverty level without basic amenities of life. Effective and economic management of hill torrents however presents complex problems due to flashy flood flows coupled with uncertainties of their occurrence and heavy silt charge.

Efforts have been made conventionally by local

residents to capture and utilize the Hill Torrents flows by diversion into bunded fields to recharge the soil moisture. The effective flood management of hill torrents has been a problem of great practical importance. Effective flood management requires a balanced application of structural and non-structural measures. The structural measures minimize the effect of flood waters while the non-structural measures facilitate in reducing the intensity, duration and sediment load of flood flows. The structural measures include dikes, flood walls, channel improvement, anchor supports and drainage galleries, diversion/dispersion structures and storage/retention dams, etc. Non-structural measures include flood warning and forecasting systems, temporary evacuation, permanent relocations, and land use regulations. In case of hill torrents, watershed management by terracing, gully control, afforestation and pasture development constitute important non-structural measures.

13 technical papers were presented in this

International Symposium. Out of these two of the papers have been contributed by the Japanese experts while one paper has been received from an FAO expert, the remaining 10 Papers have been contributed by national experts. Brief digests of these papers are:-

Paper No. 1 "Watershed Management in Japan" by Yoichi Kashi, Chief Consultant, Mithawan Watershed Management Project.

This Paper describes watershed management activities in Japan with particular reference to the role of forests in improving the catchment characteristics. The forests are reported to have a considerable stabilizing affect on the hydrological cycle by acting as a reservoir in attenuating flood peaks and contribute significantly to the erosion control. Various forest management engineering techniques employed in Japan have been discussed. These include works for ravines and watercourse improvement, as well as, slope protection and drainage improvement measures.

Paper No. 2 "Management of Kaha Hill Torrent" by Engr. Syed Mansoob Ali Zaidi.

The Paper presents the past and current scenarios of hill torrent management, with particular reference to the Kaha Hill Torrent in D.G. Khan area. The Paper highlights the problems in the context of local setting, management efforts made from time to time and evaluates the performance of recently constructed distribution structures. It present international practices and future scenario for integrated flood management of Hill Torrents. The proposed plan includes measures in the Parched area, in the catchment area, and in the canal command area affected by Kaha Hill Torrent. The proposed structural measures include flood control and storage dams, check dams, debris flow breaker screen structures, channel works and hill side slope protection structures. The non-structural measures include afforestation vetiver grass hedges, range management and institutional measures.

Paper No. 3 "Problems in Disaster Prevention in Developing Countries" by Masayuki Watanabe, Director JICA.

The Paper describes the problems associated with flood disasters and their causes. It presents analytical approach for dealing with flash floods and protective measures against flood flows containing large amount of sediments. The proposed structural measures against hyperconcentrated flows include screen type debris flow breakers, sabo dams and fan segment shift methods. Based on his international experience in the Far East and Nepal, he has also included measures for control of pyroclastic flows.

Paper No. 4 "Harnessing of Hill Torrents in Pakistan: A Conceptual Analysis" by Sabir Ali Bhatti and Muhammad Nasir Khan.

The Paper presents a comprehensive account of the studies and the measures for efficient management of Hill Torrents in Pakistan. It brings out current status of Hill Torrents Development and also presents

conceptual plan for their harnessing. This plan covers various measures for different groups of Hill Torrent Areas. These measures include dispersion structure, diversion structures, detention reservoirs and storage dams/diversion structure. The Paper also identifies development priorities for long and short-term plans in the identified groups of the Hill Torrent Areas.

Paper No. 5. "Flood Management of Hill Torrents in Pakistan" by Dr. A.S. Shakir, Engr. Asrar-ul-Haq, and Dr. B.A. Shahid.

The Paper reviews the exiting flood management techniques used for management of floods caused by hill torrent. The Paper highlights various flood management approaches and techniques. The effective strategies for better management of hill torrent flood have been described. The Paper discusses technical issues related to management of hill torrent flood, economic availability of flood management measures and the sustainability concerns.

Paper No. 6. "Status of Rod Kohi System Management -

A case study" by Dr. M. Shafiq, Engr. M.Z. Ikram and M.Ahmad.

This Paper presents the case studies conducted in D.I. Khan and D.G. Khan hill torrent areas and discusses the constraints of the prevailing irrigation system and production potentials in the fields of land utilization, live-stock and range/forestry development.

Paper No. 7. "Role of Small Dams in Stream flow Regulation" by Engr. Abdul Ghaffar.

The Paper provides an analysis of stream-flow regulation and flood control achieved through existing small dams. It has been concluded that the small dams are playing a good role in control of flood and erosion, besides providing water for irrigation. The need for setting up of hydrological network and data collection has also been brought out for better planning in the future.

Paper No. 8. "Potential for Efficient Utilization of Hill Torrents for Crop Production in Dera Ghazi Khan" by Munir Ahmad, Asif Ali Bhatti and Muhammad Aslam.

The paper examines the current agricultural practices in the Hill Torrent area of D.G. Khan and brings out the need for uplift of the area through a research based integrated land use approach. The suggested measures include land forming and water harvesting technique, construction of low cost dams, introduction of trickle and sprinkle systems and integrated improvement of agriculture, live-stock and agro horticulture.

Paper No. 9. "Participatory Approaches in Integrated Watershed Management" by Moujahed Achouri, FAO.

The Paper presents the participatory approach for integrated and effective water shed management. It has been argued that the participation of the concerned population can enable the community to own the development actions and build their commitment to the project objectives and operations. The Paper high-lights major constraints in implementing the participatory watershed approach and the needed actions for resolving them with particular reference to the Mithawan watershed management project.

Paper No. 10 "Upper Kaha Hill Torrent Management" by Muhammad Azam Baloch and Bashir Ahmad Mian.

The Paper describes the Master Plan for Upper Kaha Hill Torrent Management. The methodology proposed for this master plan combines scientific evaluation of the land and water resources of the area with local approaches and implementation strategies.

Paper No. 11. "Flood Management of FP Bund Complex" by Sindh Irrigation Department.

The Paper describes F-P bund complex, flood protection plan strategy and recommended works for protection of the area.

Paper No. 12 "Range Management in D.G. Khan" by Range Management Unit, D.G. Khan.

The Paper provides a brief account of the range management activities and methodologies in the D.G. Khan area.

Paper No. 13. "Rod Kohi System in D.I. Khan Division" by NWFP Irrigation Department.

The Paper presents the salient features of the Rod Kohi System in the D.I. Khan Division. It also describes short and long term plans for Rod Kohi Development Project in the area.

Honourable Sir,

These papers on presentation will be discussed by the participants and we will prepare recommendations based on the above discussions and submit to the Government for consideration. These recommendations, we hope, will go a long way in providing a base for designing and implementing the hill torrent control projects in a much better way.

I would now request your honour to very kindly declare this symposium open.

Thank you.

Pakistan Zindabad.

Address of Welcome

By

Engr. Mazhar Ali,

President, Pakistan Engineering Congress.

Honourable Minister for Irrigation and Power Punjab, Sardar Maqsood Ahmad Khan Leghari, esteemed guests, delegates and colleagues, Aslam-o-Alaikum.

The Pakistan Engineering Congress feels greatly honoured to welcome you to this International Symposium on Management of Hill Torrents. We are specially indebted to Sardar Sahib for gracing this occasion inspite of his busy schedule. This is an affirmation of his keen interest in this Professional Organization and in the subject of this symposium.

The Pakistan Engineering Congress, founded in 1912, is the premier and the oldest professional engineering body in the country. Its objectives are well known to your goodself. For the information of those guests who are gracing our function for the first time, I may say that the Congress aims at providing opportunities for exchange

of knowledge and experience amongst the engineers of the country. It makes its contribution to national development and professional advancement through Annual Technical Sessions and Symposia. More than 670 high class papers have so far been presented at the Congress platform. Many of them achieved international acclaim and have become the basis of engineering design and practice in various fields.

Sir, the Pakistan Engineering Congress in its effort to further its major objectives, set up the Multan Local Centre in 1993 to promote exchange of experience and knowledge with the local experts. Today we are holding the 2nd Annual Session of this Centre and this symposium the first major activity. About 18 Technical Papers will be presented here in the Symposium today and the Technical Session tomorrow. Engineer

Mansoob Ali Zaidi was elected as the Chairman of Multan Centre and he has shown great initiative and drive in organizing its affairs. He is the moving force behind today's function. He will give a brief introduction to these welcome.

Mr. Minister, Sir! without a strong and properly organized indigenous engineering consultancy profession and construction industry, with in built checks and balances for quality assurance, cost and time control, and ethical standards, we will not be able to achieve self reliance and build our technological skills and construction capacity to undertake major works and development projects. These activities are in their growing stage and need encouragement and support in technical, managerial and financial fields, and for establishing self-discipline and accountability. Pakistanis must be given a leading role and major share

in the consultancy and construction contracts awarded in Pakistan. We have a wealth of experienced and competent Pakistani engineers, managers and financial experts who are capable of performing to the highest acceptable standards. It is a matter of growing concern that in increasing number of cases, Pakistani talent is being made to play a secondary role. There is predominance of turn key foreign contracts, and controlling and directing role by foreign consultants and contractors. This is leading to avoidable heavy costs in foreign exchange and foreign debts. The dominance of foreign interests greatly suppresses the growth and training of Pakistanis at the top management and decision making levels, and erodes their confidence.

Sir, Engineers are the agents of change. They are the humble people servers, building the quality of life. Over 80% of all development is the result of Engineer's efforts. They are

the backbones of any progressive society.

But Your Honour, these vital components of the development mechanism are not receiving equity, consideration and the status that is their due. The Prime Minister of Pakistan has on more than one occasion, repeatedly promised that all Technical Ministries and Organizations should be headed by relevant Professionals but instead of implementation of the promise, the technical posts are progressively being transferred to non-professionals. In Punjab for example, Sir! only one nation building department has a professional Secretary, while all others are held by non-professionals. The engineering profession is at the moment worst hit and plagued with job shortages. About 8,000 engineers are un-employed and are denied the opportunity to make their contribution to the national development and alleviation of poverty. Sir, we need your support in this direction to make the

government realize the seriousness of the situation.

The Symposium would discuss the Hill Torrents of Pakistan, specially in D.G. Khan area and the possible measures to relieve the deep distress faced by the people whenever there is heavy rainfall in the area. The catchment areas of these torrents are characterised by steep slopes, lack of grass and fresh cover, and periodic heavy loss of life and property. Due to the keen interest shown by the President of Pakistan, we hope that a reasonable remedial and control plan would be implemented. Pakistan Engineering Congress would be happy to establish a regular chapter on Hill Torrents to support this effort and would request that His Excellency the President of Pakistan may be requested to make a reasonable grant of about 2 million rupees to the Congress.

I once again thank you Sir, and all the esteemed guests for gracing this Inaugural Session. Pakistan Paindabad!

Inaugural Address

By

Sardar Maqsood Ahmad Khan Leghari,

Minister for Irrigation & Power, Punjab.

Mr. President, distinguished guests and Members of Pakistan Engineering Congress!
Assalam-o-Alaikum

I am grateful to the President of Pakistan Engineering Congress, the Chairman, and Executive Committee of Multan Centre for inviting me to this International Symposium on Management of Hill Torrents in Pakistan, enabling me to be amongst so many very senior engineering professionals and exchange views with them. I really feel pleasantly elated to find myself in this august forum.

I also wish to thank the Pakistan Engineering Congress for the response to my call in my inaugural address to the audience of the last symposium on Flood Control and holding this International Symposium on Management of Hill Torrents in Pakistan. I would look forward to the results on the deliberation and recommendations of the Symposium. I would also wish that the Congress takes similar steps to respond to other issues

mentioned by me in the above address, like continuous reduction in the capacity of the eastern rivers specially the Sutlej, the since sixtees.

I am incharge of an Engineering Department and therefore have keen interest and sympathies with the profession.

I am glad that the Congress members have created the standards that are followed in most of the countries of this world. What remains to be looked into is the present scenario of our efforts in this direction.

Creation, presentation and discussion of professional papers and articles is creditable but to apply their results is at last to me, very important in the context of improvement in execution methods for development works.

I congratulate Pakistan Engineering Congress for setting up and running a

Centre at Multan for bringing the technical discussions to this otherwise somewhat backward part of our province.

Mr. President! I appreciate that we have a welath of experience and talent amongst our professionals and am with you in proper identification of their role in consultancy and top management, but we must also assess why foreign consultants and contractors are in the first place inducted for our projects.

Mr. President, you have rightly expressed your concern about our sick construction industry, but I would go further to request your Engineers to go deeper into this issue and bring out a solid proposal, which will find be working on your side. In doing so you will also have to consider the thinking and objectives of the financiers while we talk about domination by foreign

elements in our design and construction fields.

Mr. President! I agree with you that Engineers are by and large responsible for developmental quantities and quality and are the leading forces of progress and prosperity. Considering the extent of their role in development, the maintenance of general standard of National Engineering fibre is very important. I am always for continued education and training and would like to stand by you in furthering the ideas and programmes to achieve this end.

You have yourself pointed out that the Prime

Minister of Pakistan already endorses your views about assignment of Engineers to Engineering locations and I would always be available to extend help to possible extent. I am also concerned about the number of unemployed Engineers and would support your proposals for eliminating or mitigating this malady.

Your proposal for setting up a regular chapter on Hill Torrents is timely and encouraging, but I would like to go further and suggest to assess the feasibility of setting up a Hill Torrents research and control organization in the field also. I would expect a

detailed proposal, complete in all respects and fit for placing before the government.

At the end I once more thank you Mr. President, Chairman and Executive Committee of Multan Centre of Pakistan Engineering Congress for inviting me to this very important and useful Symposium.

I now declare this International Symposium on Management of Hill Torrents in Pakistan and the 2nd Annual Session, formally open.

Pakistan Painsdabad.

PAKISTAN DEVELOPMENT SENARIO

LAND REFORMS

Pakistan has been a captive of powerful vested interests If landlords who shaped agriculture policy to protect and enhanced their privileged position, often to the detriment of national well-being. Land reforms were riddled with loopholes and even these were not enforced.

Flood Management of Hill Torrents in Pakistan

Dr. A.S. ShakirAsrar-ul-Haq***Dr. B.A. Shahid.*

ABSTRACT

This Paper reviews the existing flood management techniques used by the government agencies for management of floods caused by hill torrents. The effective strategies for better management of floods with special reference to hill torrents in Pakistan are discussed.

Flood management of hill torrents has several alternatives or combination of adjustments. A choice of optimal solution can be made using cost effective techniques. The effective flood management requires a balance application of

structural and non-structural measures. The structural measures minimize the effect of flood waters while the non-structural measures facilitate in changing the intensity, duration and volume of flood flows. The structural measures include dikes, flood walls, channel improvement, diversion weirs, and construction of reservoirs, etc. Non-structural measures include flood warning and forecasting systems, temporary evacuation, permanent relocations, flood proofing, flood insurance and land use regulations. In case of hill torrents, watershed

management by terracing, gully control, afforestation and pasture development are also part of non-structural measures.

The analysis highlights the weakness in the existing practices used for forecasting and management of floods caused by hill torrents. The results of his study indicate that proper management of floods caused by hill torrents is required. The responsible agencies need to evolve comprehensive and integrated strategies for this purpose.

*Associate Professor, Department of Civil Engineering, University of Engineering & Technology, Lahore.

**Deputy Director (Design), Coordination Zone, Irrigation & Power Department, Lahore.

***Superintending Engineer, Derajat Canal Circle, D.G. Khan.

Role of Small Dams in Stream Flow Regulation

**Engr. Abdul Ghaffar*

Small Dams Project is spread over an area of 2.2 million hectares (Rawalpindi Division). Average annual rainfall varies very sharply from 1750 mm in North to

450 mm in South. Water resources development is considered as the most appropriate way to develop this backward area. Unfortunately the rainfall

pattern, and topography of the area make it vulnerable to high erosion. Small Dams Organization has constructed 31 Dams in this area. An analysis of

these Dams with reference to stream flow regulation reveals that these Dams are playing a good role in controlling flood and erosion, beside providing water for irrigation. The

purpose of stream flow regulation/flood control needs to be given due consideration at design stage of Dams to achieve maximum flood routing. There is a need of setting

up of hydrological net work and achieving data for future use. There are quite a few explicit and implicit benefits of the dams which should be recognised while taking policy decisions.

*Deputy Director, Planning Design and Command Area Development Division, Rawal Dam Colony, Islamabad, I&P Department.

Potential for Efficient Utilization of Hill Torrents for Crop Production in Dera Ghazi Khan

**Munir Ahmad,*

***Asaf Ali Bhatti ***Muhammad Aslam*

Hill Torrents (Rod-Kohi) are the main source of irrigation for agricultural purposes in D.G. Khan district. Torrents emerging from Sulaiman Range are traditionally diverted from main stream into irrigation channels by constructing rock structures. But these structures are very often washed away because of the high force of water which goes waste into the river. This unpredictable

magnitude of water not only plays havoc in the low lying areas but also causes cutting of the banks and siltation of the irrigation channels. As a result one third of the cropped areas is being damaged every year while the rest remains abandon due to non-availability of water. For the uplift of the area and poverty alleviation, a research based integrated land use approach may be

extended. This can be applied by land forming and water harvesting techniques, construction of low-cost earthen reservoirs for supplemental irrigation through economical trickle & sprinkler systems (as water is a limiting factor in the area), introducing improved crop varieties? livestock breeds and agrohorticulture system.

*Senior Scientific Officer, WRRRI, NARC. **Senior Scientific Officer, WRRRI, NARC. ***Scientific Officer, WRRRI, NARC.

Participatory Approaches in Integrated Watershed Management

**Moujahed Achouri*

As population continue to raise, which have doubled every 25 to 30 years during the twentieth Century, pressure on upland resources have increased and watershed degradation is becoming a worldwide concern. Consequences of

this degradation are the Accidimentation of dams, catastrophic floods, damage to the human populations, agriculture activities and infrastructures. To reverse watershed degradation and to establish a significant better agriculture economy

for the watershed upstream and downstream inhabitants, it has been recognized that the integrated watershed management orientation with people's participation is the needed approach to achieve a sustainable sound

natural resources management. This approach is based on the involvement of local people in the watershed management process where their needs are taken in consideration in order to improve their socio-economic conditions and to promote their participation and contribution to the conservation goals.

The watershed management traditional approach "top-down" which was focusing in the conservation of the natural resources failed in most of the cases to achieve the desired results. The socio-economic aspects have been ignored in most of the watershed programmes. The watershed, however, in the integrated management approach is taken as a whole system where the population is being

considered as the most active factor for the watershed planning and implementation activities.

People's participation has been accepted as the major component of development programmes and the key to the success of watershed management projects. The participation of the concerned population from the very beginning of the project can enable the community to own the development actions and to build their commitment to the project objectives and operations.

The watershed degradation is becoming a very serious threat to the natural resources conservation and to livelihood of millions of people in many countries especially in most of the developing countries where

the economy is depending predominately on agriculture.

To save the situation, the following actions need to be take urgently by the policy and decision makers;

-Well defined policy and legislation for the watershed management programmes.

-Institutional and organizational arrangements in order to define the watershed management responsibilities and to ensure effectiveness in watershed programmes.

-Training and research need much more support in many developing countries.

-Funds and incentives are also needed and justified actions for a sustainable use and management of natural resources.

*Chief Technical Adviser GCP/PAK/083/JPN Mithawan Watershed Management Project., D.G. Khan.

Upper Kaha Hill Torrent Management

**Muhammad Azam Baloch,*

***Bashir Ahmad Mian*

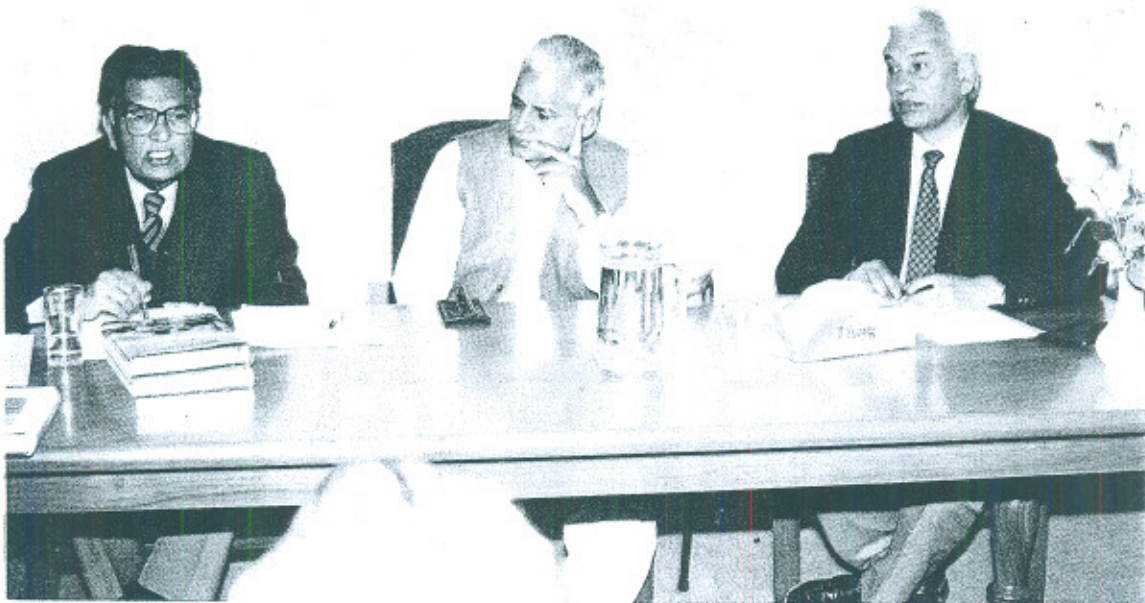
Irrigation by diverting flood water from hill torrents has been practiced from time immemorial in Balochistan. These diversions hold good for small flows but generally fail in case of major floods, causing downstream massive damages. Hill torrents originating in

Suleiman range in Balochistan bring substantial floods through its Upper Kaha watershed causing extensive damages in the downstream canal irrigated areas and on various types of infrastructures such as railway lines, canals, roads and houses in Punjab. In

order to reduce the impact of this flooding, Irrigation and Power Department, Government of Balochistan, has embarked upon a master plan for its watershed management. Proposed measures with background information have been provided in this paper.

*Secretary, Irrigation & Power Deptt; Govt. of Balochistan, Quetta.

**Chief Planning Engineer, Bureau of Water Resources, Irrigation & Power Deptt: Quetta.



Mr. S. S. Kirmani, World Bank Advisor (Left) addressing guests at a meeting held in Lahore by Pakistan Engineering Congress.



A section of Senior Engineers listening to the lecture of Engr. S.S. Kirmani. Seated L to R (front row) are Engr. Iftikhar ul Haq, Engr. S.N.H. Mashhadi and Engr. B.A. Malik.



The President and Office bearers of Multan Centre of Pakistan Engineering Congress photographed with Engr. Mazhar Ali, President and Engr. Dr. Izhar ul Haq, Secretary, Pakistan Engineering Congress.



Multan Center of Pakistan Engineering Congress held an International Symposium on Management of Hill Torrents in Pakistan. Photograph taken on the occasion shows (L to R) Engr. S.M.A. Zaidi, Chairman, Multan Centre; Engr. Mazhar Ali, President PEC, Engr. Dr. Izhar ul Haq, Secretary PEC and Mr. Nazar Muhammad Malik, Secretary Multan Centre.

WATERS FOR PEACE IN WEST ASIA A ROLE FOR PAKISTAN

By

* *Engr. Mohiuddin Khan.*

Water Wars

As a preamble it may be worthwhile quoting from the article 'Water Wars' by Mr. Rustom Irani, Assistant Producer for B.B.C. (British Broadcasting Corporation) published in the British Journal, New Statesman and Society May, 1991.

"They know it in the Middle East, and have done for a long time, there is no possibility of peace and stability in the region unless one underlying problem is sorted out - that of water resources. If this issue is not addressed, you can forget about a Palestinian settlement; about any chance Jordan and Israel have of fully coming to terms with each other; and about any real progress between Israel and Syria over the Golan Heights. Throw in the fact that relations between Turkey, Syria and Iraq, as well as the question of Kurdistan, depend largely on the

Euphrates and Tigris rivers, and you can begin to see why water is the new Middle East buzz word.

Israel has a serious water problem. According to its water commissioner, Zemach Ishay. 'We are actually using every years 115 percent of our annual water supply'. The water comes from three main sources; the Sea of Galilee (Lake Kinneret) in the North, which acts as a natural reservoir, and is fed by the River Jordan, and two aquifers, or underground supplies. One runs down the coast of Israel. Already, Israeli wells are overpumping it and sea water is seeping in.

But the second aquifer is where politics takes over from geography. It begins in the occupied territory of the West Bank, before 'flowing' underground into Israel proper. The Israeli authorities restrict



Palestinian use of water so that the water can flow into Israel where it can be pumped out. Dan Adar, Israel's water officer in the West Bank 'we are not giving any licences for new drillings for agriculture because of lack of water'.

By refusing permits for Palestinian wells in the West Bank, Israel is able to take 80 percent of this aquifer supply. And it needs every drop. Now try to imagine a 'Land for Peace' deal between Israel and the Palestinians, who, with their extraordinarily high population growth-rate, are even more desperately short of water. The Israelis are

*General Manager, Planning WAPDA, (Retd.) Lahore.

not going to allow any newly formed Palestinian state to drill hundreds of wells and prevent what amounts to a third of Israel's water resources from reaching them. Israel views it as a question of survival. The Palestinians equally see it as a matter of principle. As Salin Budwan, a farmer from the West Bank, says; 'This is my water as it is my land, and I will not negotiate for them'.

During the six-day war in 1967, the Israelis captured not only the West Bank and Gaza strip, but also the Golan Heights and Sinai. As part of the Camp David agreement in 1987, Israel returned the waterless Sinai desert to Egypt, but kept the Golan Heights. The tributaries of the Jordan flow through the Golan. Before 1967, Arab countries decided to divert these tributaries because they felt all the water was flowing down to Israel. Crown Prince Hasan of Jordan is in no doubt; 'Water was characterise the region. That's been very clear in my mind ever since the 1965 Arab Summit. The 1967 war was brought on very largely over water related matters'. Whoever

controls the Golan controls not only a strategic high point, but also the sources of the Jordan, and the river is one of Israel's water lifelines.

Despite King Hussein's stance during the Gulf War, the United States will be looking to Jordan to play a crucial role in any peace process with Israel. Jordan, almost totally desert, has less water than Israel. In the summer months, residents of Amman, the country's capital, only receive water every other day. Jordan's agriculture is stunted. The country's main source of water is the river Yarmuk, which rises in Syria, then becomes the border between Syria and Jordan, and, at its end, enters Israel joining the river Jordan. Jordan draws from the Yarmuk what it can, but needs to build a dam to store the winter floods. But Jordan is hostage to Syria upstream and Israel downstream.

Syria has given permission for Jordan to build a dam across the river, part on Syrian land. But it drove a hard bargain, which included an official agreement letting Syria

build more that 20 small dams upstream in Syria. Much of the Yarmuk will therefore be stored before Jordan gets its turn. However, the so-called 'Unit' dam can still not be constructed.

Jordan needs to borrow money from the World Bank, which will not lend it. Why? Because Israel wants a substantial parts of any stored water to be allocated to it downstream. But the time the Syrian's dams upstream are completed, if Jordan agreed to give Israel the water it wanted from the unit dam, hardly any would be left. With this in mind, King Hussein has said that the only thing Jordan would go to war over would be water.

Syria, meanwhile, is at the mercy of Turkey, Syria may have first call on the Yarmuk river, but the Euphrates and Tigris both rise in Turkey before travelling through Syria and finally Iraq. The Euphrates, one of the four rivers of Eden mentioned in the book of Genesis, makes the Yarmuk look like a stream.

Turkey has been building 21 dams on the

Euphrates and Tigris rivers in the south east of the country. The massive Attaturk dam, the fifth largest rock-filled dam in the world, has just been completed. It is a matter of great pride to the Turks, especially as the work went ahead without World Bank funding because of Syrian and Iraqi objections. The former Prime Minister, Suleyman Demirel, says that Syria and Iraq have no right to the waters from the two rivers; 'Why should they have any right to the waters of Turkey? Do we have the right to the petroleum of these downstream countries? The upstream people have the absolute right to use the water. The Turkish waters are not international waters'.

Syria is receiving 500 cubic metres per second flow from Turkey. But the quid pro quo of this secret deal is that Syria has to stop supporting the Kurdistan Workers' Party (the PKK). Kamran Inan, Turkey's minister for the south-east region puts it discreetly; 'It's a kind of gentleman's agreement, covering large areas, not only concerning water. You

might understand that message by itself'.

Some in Syria despair at how Turkey can dictate the quantity of water it releases. The director of the Tabqa dam, Shaker Bazoura's says 'We don't want a gift, we want our right to the river which is an historical right. We Don't want 500 or 400 cubic metres because today they give is 500, but may be it will be cut tomorrow'. Early last year, Turkey did cut off the flow for a month, when it started to fill the lake behind the Ataturk dam.

Iraq, the third country through which the Euphrates flows, is also vulnerable, being dependent on the decision of both upstream countries. In 1975, when Syria was filling its own Tabqa dam, the Iraqis massed troops on the border and threatened to go to war against Syria.

Syria is constantly charged with double standards. As Suleyman Demirel of Turkey says; 'If Syrians say that on the Yarmuk, they have the right as upstream people, and then when it comes to the Euphrates and Tigris, they

try and say that the upstream people in Turkey don't have the right. That is a double standard.

Water is what is known as a zero-sum game. One party's gain is another's loss. Washington is flirting with two possible solutions. One is a 'Peace Pipeline', the brainchild of Turkey's President Ozal. This would involve one or two water pipes that would transfer water from Turkey's Seyhan and Ceyhan rivers across the Middle East and provide for all the countries in the region. But everyone knows this is pie in the sky, unless countries are willing to cooperate with each other. The other is a Middle East conference specifically to discuss water resources.

The Crown Prince of Jordan gives a maximum of a decade before any or all of the water problems flare up. 'The water here is crucial. Unless by 2000 we have an agreement between states, then countries in the region will be forced into conflict. There's no two ways about it'.

Peace pipeline from Turkey

Turkish President Turgut Ozal had proposed

that a 'peace pipeline' be build to divert water from the Ceyhan and Seyhan rivers in Turkey to the Arabian peninsula. Gunes Taner, political advisor to the Government of Turkey indicates some details. An American firm called Brown and Roots (firm which designed the gates of Taunsa Barrage) had carried out studies to pump water from Seyhan and Ceyhan rivers to the middle east. The project involves building two pipelines over more than 2000 K.M. One to the holy city of Makkah in Saudi Arabia and the other via Kuwait to the United Arab Emirate (UAE). The cost could be about 21 billion dollars. Each pipeline would carry one billion dollars. Each pipeline would carry one billion cubic meters of water annually. The water could be used for town supplies and irrigation. The idea was that the peace pipeline could help foster peace in the middle east by bringing countries together to cooperate on such a major project. The cost could be shared by the countries involved and the idea was that any country along the pipeline could buy water. Another suggestion made by the Turks was to

have a gas pipeline from Qatar to Turkey as a quid pro quo. This is one reason that Turkey suggested the water peace pipeline of over 2000 K.M. to U.A.E.

Turkish President, Turgut Ozal invited middle east leaders to a summit to discuss the water resources in the region. A recent news item by the Anatolian news agency stated that the international water summit was held at Istambul on November 3 to 9-1991.

Other Proposals for Water Supply to Saudi Arabia

The Saudi Government had seriously considered the proposal of towing icebergs from Antarctic to the Red Sea. It was calculated by a French Engineering Company, Cicero, that the cost of towing and 85 million ton iceberg to Saudi Arabia would be US\$ 53 Cents a cubic metre compared with US 79 Cents a cubic metre for desalination of sea water. The Gulf has the greatest concentration of desalination plants. According to a recent report 26 of them turn out 138 million gallons of fresh water a day (i.e. 214

cusecs). Another 22 are being built to double the desalination capacity. The project of towing icebergs from Antarctic was given up as there are better projects discussed in the following paragraphs.

Nile Water Project for Saudi Arabia

Another gigantic project which is under consideration is that of bringing Nile water to Saudi Arabia for which a study is under way to carry part of Nile river waters to Saudi Arabia across the Red Sea, according to Al-Dastour of Amman. An unnamed Arab engineering firm currently engaged in the project, will carry Nile waters through six huge pipes, four of them starting from main reservoir in the Sudanese coastal City of Suakin and two from Port Sudan on the Red Sea. The Nile water pipes will go upto Riyadh via Jeddah. The project will cost about two billion dollars and is aimed to carry twenty million cubic meters of Nile water yearly to the heartland of Saudi Arabia for making the parched deserts bloom. Some European firms are also interested to collaborate with the Arab engineering firm and provide

technical assistance for the unique project.

The project is of great importance as it supplies water not only to Makkah and Madina but also Riyadh the capital of Saudi Arabia. As Makkah and Madina are visited by millions of pilgrims every year for Haj and Umra, assured water supply for these areas is essential. Some comments on this proposal with other feasible and economical alternatives for water supply of Riyadh are being discussed in the following paragraphs.

Distance from river Nile to Jeddah is 375 miles (609 K.M) out of which 150 miles (244 K.M.) consists of crossing of the Red Sea. Riyadh is 550 miles (894 K.M.) from Jeddah. As the water requirements of Riyadh and other areas on the way have to be obtained from river Nile it would increase the cost of infra-structure works such as tunnels under the Red Sea and crossing of hills. It would have been better if Riyadh had an independent source of supply. The existing water supply requirements of Riyadh from desalination plants from the Gulf can

meet only small quantities of water but cannot meet all the future requirements and also feed areas west of Riyadh.

Availability of Water

Availability of water is an important factor which has to be considered in any scheme for assured water supply. The diversion from river Nile from Sudan makes available perennial water. Sudan has not fully utilized its share of the Nile water which is 18,500 million cubic meters per year. In future it is likely to utilize this. For future requirements, Egypt and Sudan have started what is known as the jonglei project which saves 4550 million cubic meters in the first phase and 4200 cubic meters in the second phase. There is another future scheme for training of Mancher Marshes which may yield another 4000 million cubic meters. It would be seen from these figures that diversion of water from Nile through Sudan to Saudi Arabia is feasible particularly for the coastal areas of Jeddah Makkah and Madina. It may not have enough water for the rest of the Arabian Sub-Continent which is vast.

Besides it is also not economical and safe to transport water for such a long distance across Saudi Arabia from the Nile river.

A typical project for Saudi Arabia is the one to get drinking water from the Gulf for Riyadh. The project (as reported in Pakistan and Gulf Economist Oct. 15-21 issue of 1983) covers a 466 K.M. long double water transmission pipeline with a diameter of 1,524 MM from the sea water desalination plant on the Gulf to the Saudi capital Riyadh. The arrangement will ensure a supply of some 830,000 m³ of drinking water daily (260 cusecs).

The starting point of this long-distance pipeline is a pumping station near the desalination plant at Al-Jubail where the drinking water is drawn from seven steel tanks. The final point of the main line is the High Point Terminal, situated about 40 K.M. from Riyadh, 690 meters above the sea level. The long-distance transmission system devised by the Mannesmann concern of West Germany includes several intermediate pumping stations.

The system is an integral part of the development plan which costs \$ 18 billion for improving water resources and for irrigation. One serious limitation of this project is that in case of pollution in the Gulf the plant becomes non-operational as it was threatened during the Gulf war. Desalination of water is also quite expensive as compared with transport from natural sources.

Proposals for supply of Water to Kuwait.

The nearest and most plentiful source of water for Kuwait could be from Euphrates but the relations between Iraq and Kuwait though both being Arab and Muslim countries are such that Kuwait had to depend heavily on

desalination plants for its water supply. Recently after the end of the Gulf war and the vacation of occupation of Kuwait by Iraq proposals are being considered for supply of water to Kuwait from Shatt al Arab. This river is the boundary of Iraq and Iran over which they fought the eight year war. Iraq has now conceded it as an international boundary and Iran has offered the water from its side to Kuwait.

Plan for Supply of water from Pakistan to UAE and Saudi Arabia.

During the early 1980 when the author of this paper was in charge of the Planning Division, Water of WAPDA, the concept of export of water from Pakistan to the water starved areas of Gulf

Sheikh-doms and South Eastern part of Saudi Arabia was conceived. As a first step the water of the Hingole river in Baluchistan were considered for transport to the Gulf as most of the water of this river was going waste to sea with little use for irrigation. The river outfalls into the Arabian sea a few miles east of Ormara. UAE was keen to have this supply and agreed to transport the water by an under-sea pipeline. The idea is to have a multipurpose dam on Hingol river which will store the water. NESPAK is investigating this project for WAPDA. The following are some of the salient features of the project:-

Height of dam	165 feet
Gross Storage	0.78 MAF
Dead Storage	0.45 MAF
Live Storage	0.33 MAF
Net annual available	0.21 MAF
Annual local demand for Irrigation and domestic	0.063 MAF
Expectable surplus	0.153 MAF
Power generated	2.5 MW*
Culturable commanded area for irrigation	11,326 acres

The distance of pipeline from Hingol to Abu Dahbi in UAE is about 1000 K.M as compared with over 2000 K.M. from Turkey. The Turkish pipeline has the further disadvantage that it has to cross a number of countries on the way and many natural obstacles.

In the second stage the water pipeline can be extended to connect the main Saudi Arabian water pipeline from Jubail to Riyadh, a distance of 550 K.M. The extra water for this could be obtained from storages on other rivers east of Hingole and even from the Kotri Barrage on Indus.

Pakistan's Role in ensuring 'water peace' and better trade in West Asia.

It would be seen from the previous paragraphs that meeting of the demands of all the countries of the middle east is a vast job which cannot be met by one country alone. Turkey is no doubt fortunate being the upper riparian on Tigris and Euphrates rivers. Being blessed with plentiful rainfall it can store the water for use as it has a number of good dam sites

but the problems is that there are already problems of sharing of waters on major rivers like Euphrates and Tigris. Both Syria and Iraq requested that the volume of water which Turkey was prepared to guarantee for releases below its border on Euphrates should be increased from the present 500 cmecs to 700 cmecs as before Turkey constructed its dams 950 cumecs were being received at the border. The Ceyhan and Seyhan rivers are small and could not supply much water. This may be the reason why the countries of the region were cool on the proposal of peace pipeline from Turkey. It is no doubt a generous gesture on the part of Turkey to supply water to other countries but a solution should be found to make the best use of this water. As things stand Turkey could reduce the scope of its project to supply water to its immediate neighbours like Syria, Iraq, Jordan and West Bank. If this is done, it would be a great service to the most explosive area of the middle east.

It goes to the credit of Turkey that though it

was in a position to cut off water flowing into Iraq from Euphrates by storing at Ataturk dam it did not resort to this when Iraq attacked Kuwait.

As suggested in the previous paragraphs Sudan could supply water from the Nile for the Western part of Saudi Arabia and Pakistan could supply water to UAE and South Eastern part of Saudi Arabia. Iran could take care of the requirements of Kuwait from the Shatt al Arab.

The Great Indus Food Machine.

Most of the middle eastern countries import their food. As world populations are increasing, the situation is becoming worse for food supplies. A United Nations Environmental programme report reveals that drought turns 50 million acres of land a year into desert. The effects of the African drought have been compared to nuclear detonation. The food situation is so acute in Africa that there are reports that certain tribes are returning to the practices of cannibalism. For the Gulf countries, Pakistan has

been one of the important supplier of food and fruit. The Indus basin is known as one of the vast resources for food and fibre production in the world. It is worthwhile quoting here from a report by Ford Foundation of 1977.

"The major river basins of South Asia - the Mekong, the Irrawady, the Brahmaputra, the Ganga the Krishna and the Godavari currently support more than 690 million people. By the year 2000 they will have to produce most of the food required for the subsistence of almost twice that number.

Of these river systems only the Indus appears to have the installed infrastructure needed to achieve very great increases in productivity within the next fifteen years. Very substantial investments were made between 1860 and 1947 in the creation of the Indus Basin Irrigation system and, since the Indus Waters Treaty of 1960, massive additional investments have been made to build link canals and high storage dams. Taken together with the natural advantages of

climate, rich soil, long growing seasons and a river system which widely distributes water across the northern section of the Indus Plain, this has resulted in the most extensive water control and irrigation command system yet established, a system with enormous underutilized agricultural potential.

Approximately one quarter, or fifty million acres, of Pakistan's land area of slightly less than two hundred million acres is currently under cultivation. Of the cultivated fifty million acres, two-thirds is under irrigation. Even though new varieties and better cultivation have brought substantial improvement during the past two decades, yields per acre remain low, averaging under one half ton of wheat and under seven tenths of a ton of rice per acre. Most agricultural scientists would agree that with the right inputs, high technology farming practices and increased cropping intensity, further substantial increases in productivity are now feasible. Agronomists and plant breeders stress that the current available germ

plasma is not a constraint. With proper nutrients, with control of pests and diseases and with more efficient management of water, yields of both wheat and rice can be significantly improved. Cropping intensity, now estimated to average less than 120% can also be increased. Intensities of 150%, 180% or even 200% are not unattainable. Cereal yields of three tons per acre per annum on even two-thirds of Pakistan's cultivated area should result in production of one hundred million metric tons of grain annually. Even if only half of Pakistan's currently cultivated land were brought under intensive cultivation during the next fifteen years and even if average annual yields were only two tons per acre, it is reasonable to argue that annual productivity of cereal grain could reach fifty million metric tons -- more than three times the amount currently being produced. This would be sufficient to meet Pakistan's own needs and to permit it to be the major exporter of grains in south Asia.

Thus, if Pakistan is conceived of as an enterprise -- a factory -- with the central development objective of increasing food and fibre production, it may be argued that the Great Indus Food Machine within that factory, has all, or nearly all, the components and raw materials required to achieve very high production. There would appear to be few technological constraints now or in the immediate future".

Recently Pakistan has become the world's fourth largest exporter of cotton due to the efficient agricultural practices followed. The production of wheat and rice is bound to increase considerably due to the signing of the water accord between the provinces this year. In the past considerably water about 20 MAF to 40 MAF used to be wasted to the sea for want of an agreement on sharing water though large areas were short of water and larger new areas were waiting to receive water. Pakistan could easily become the granary for the Gulf countries.

Export of gas and oil by pipelines from the Gulf to the east.

As a quid pro quo Pakistan could get capital investment, oil and gas from the Gulf countries. Pakistan is situated at the gateway to the Gulf and any pipeline for oil and gas to the east has to pass through Pakistan. The existing natural gas pipelines of Pakistan extend upto the Southern border of Afghanistan and these could easily feed the Southern part of Afghanistan. The existing natural gas facilities in Northern Afghanistan have been piped to USSR as it was stated by USSR that transport of gas from the North to the South is not economical due to mountain ranges.

Apart from the world's largest resources of oil, the Gulf countries have the second largest gas resources next only to USSR. The gas resources of USSR are located in Siberia while their demand is in the far west in Europe whereas the gas resources of the Gulf are close to the countries which can use them. Pakistan, India and China are closest. In fact a

scheme for transport of Qatar gas by pipeline to Karachi is under serious consideration. The cost of the project of \$ 4 billion is to be borne by Crecent Gas Company of Sharja. A proposal for an oil pipeline from Iran to Pakistan is also under consideration.

An important point about natural gas is that natural gas is one of the growth fuels. Unlike oil more is being discovered every year than is being produced and at some point probably before the end of the century gas resources could exceed oil resources according to an article by Don Hedley 'world energy, the facts and the future plan'.

Conclusion

Prof. Henry Rowen of Stanford University has estimated that if oil supply of the Gulf is stopped to the US, Europe and Japan its effects will be (a) the US GNP will decrease by 18 percent (b) the GNP of Western Europe and Japan will go down by \$ 1.5 billion that is more than 30 percent decrease. The carter doctrine states that 'any attempt by any outside force to gain control of the Gulf region will be regarded

as an assault on vital interests of USA and such an assault will be repelled by any means necessary including military force'. After the recent Iraqi invasion of Kuwait, USA has propounded a new world order for peace in the middle east. In this world order, apart from restriction on armaments, the environmental and water resource aspects are to be considered. As water

shortage could also lead to water wars, it is necessary to ensure 'water peace' in the middle east. This would be similar to 'green peace' as in the case of environment. The Secretary General of the United Nations may set up a monitoring organization cell for the middle east to watch the flash points due to the conflict on water sharing. This would be similar to GEMS, the Global

Environmental Monitoring System under United Nations Environmental Programme (UNEP) and other UN organizations. The countries of West Asia should be made to cooperate in sharing the water resources in an integrated plan and UN and other international agencies could help them in achieving this goal.

References:

1. Article by Rustom Irani, Assistant Producer, B.B.C. on 'Water wars' in new Statesman and Society, May, 1991.
2. News Items from 'Gulf and Pakistan Economist and the Nation'.
3. Paper by Mr. Cool Ford Foundation on the Great Indus Food Machine, 1977.
4. 'World Energy the facts and the future plan, by Don Hedley.



THUS SPAKE-IQBAL

- It is not wisdom to flee from the axe
how many rubies are still hidden in the heart of stones.
- The dark blue sky is never empty of new stars.
- Only stones do not contradict themselves.
- To live without wounds means not to live
One must live with the fire under the feet.

MAIN ISSUES IN LOW INCOME HOUSING PROJECT AND POSSIBLE ROLE OF NATIONAL HOUSING AUTHORITY IN PAKISTAN

* Engr. Nazir Ahmed

Population Growth

The population of Pakistan has been growing very rapidly since 1947. The total population of Pakistan in 1951 was 33.78 millions which grew to 84.25 millions in 1981. The present population is estimated at 123 millions. Present urban population is estimated at 43 millions, the rural population at 80 millions by 1993.

The population of Pakistan increased at an average annual growth rate of 2.5 percent during 1951-61. During 1961-72 intercensal period (11 years and 7.5 months) the average annual rate of growth was 3.7% whereas during 1972-81 intercensal period (8 years and 5-1/2 months) population grew at an average annual growth rate of 3.1 percent. The urban population grew at annual growth rate of 4.8 percent during 1961/72 and

at 4.4 percent during 1972-81.

Housing Needs

The annual growth rate of households has been lower than the annual growth of population during 1961 and 1981; however average household size increased considerable during his period. The annual growth rate of population indicates the growing housing need and the increase in household size points to possible overcrowding. The Census figures also show that there has been increase in the size of housing units alongwith the increase in size as well as number of households during 1961 and 1981. These trends indicate that the overcrowding situation that existed in 1961 has not changed very much. It is also reported in many papers and reports that while urban population grew at annual growth rate of

4.4% the housing stocks increased at only 3.7 per annum. These trends and figures give an indication that there is a considerable housing backlog in addition to annual incremental demand on account of population growth.

Based on the above population figures it is estimated that there is annual incremental need of about 270,000 housing units in urban areas and about 250,000 housing units in rural areas in addition to the existing backlog. The housing backlog has been estimated at 3.00 million units in 1980. These figures represent a big challenge for the government of Pakistan. To provide decent shelter and urban services to over half a million additional households every years one requires enormous financial, technical and managerial resources. pmo.

*Director, Town Planning, Multan Development Authority Multan.

to all small and large plots. There is enough room to improve physical planning practice by bringing in elements such as pedestrian access and cul-de-sacs etc. One may review the planning standards with an objective of most efficient use of scarce land. It is possible to achieve about 70% marketable land in a well designed low-income housing scheme. Design standards of utility services are also high for the low income projects however to reduce them one needs to have a detailed study of all possibilities before making any solid recommendations therefore, scope of developing a manual of reduced standards may be given a serious thought.

On the face of limited resources planning and execution of projects on the basis of incremental development approach may be adopted. One can take up demonstration projects to replicate experience of Hydarabed Development Authority. In fact planned slums are better than the unplanned ones and one may therefore think of this strategy as well.

Present regulatory controls and procedures of

building permits are time consuming and have a negative effect on housing construction activity by the lowest income groups. Often people build entirely a different structure that the one they get approved, they go through the process of plan approval only to complete a formality. It may be better to allow 3 marla owners to build as they like.

House construction/Improvement and Costs.

Construction cost of a decent shelter has gone very high. It is often not possible for the poor to build house within the means of his income while conforming to the established standards of construction. Materials and design cost were already very high and privatization of Cement has increased it more. At present average construction cost ranges between Rs.280.00 to Rs.350.00 per square foot. The quality of construction needs lot of improvement. There is dearth of skilled construction workers who are also willing to adopt new and cost efficient methods of construction as against traditional styles. Most of the construction workers get their training in

an in formal manner. There is need of increasing training facilities regarding construction industry alongwith setting out of well designed training programs.

Participation by private Sector.

The need for private sector involvement in the housing sector can not be over emphasized. In Pakistan private sector has contributed in the building of residential units/flats very effectively, although beneficiaries of private sectors activities in housing, are mainly upper middle and higher income groups. Construction of flats by private builders has been a booming business in Karachi. Private builders/developers invest in housing with definite motive of money making, therefore, their land development/construction ventures are not afforded by the low income groups. Recently in Karachi private developers were attracted by KDA to participate in housing activity for low income people and this resulted in the involvement of private sector in Surjani Town. On completion of Surjani Town one may be in a position to assess future scale of participation by

private builders/developers in low income/low cost project.

There are quite a few land developers in the private sector all over Pakistan but most of them end up doing illegal subdivision of land and after they sell this land they get out it without putting in any civil works. Very few developers get their land subdivision/layout designs approved from the Government Agencies. Very often these illegal land subdivision have no space allocated for community facilities and streets are kept very narrow with no possibility of public bus routing in future, street providing access to large plots are also kept narrow. The width of streets range from 10 to 20. In cities where development authorities exist regulations for the private housing schemes are being enforced. Private developers are required to mortgage 20% of saleable area as guarantee against development, but it is a common seen that private developers fail to provide the civil works in about 90 cases. Discussions with both private land developers and government officials

point towards the need of finances by the private developers to complete the development works. Area development schemes done by private developers do not cater for small plots, the smallest size of plot they provide is 5 marlas. There seems to be considerable scope to get private developers interested in carrying out development in their schemes by providing a certain percentage of 3 marlas plots in lieu of reasonable financing.

Access to Finances.

The low income people are barely making their both ends meet, expenditure for food and clothing gets the top priority. These families of meager income can hardly save enough to improve or build a decent shelter. Self help housing credit association can encourage savings for housing. An informal system of generating funds through a fixed contribution every month by each member of the group is operating in the country. This system is called committee system. In this system interested people get together and decide to start a committee, a maximum limit of fund to be generated is fixed then

each member contributes his share to build the fund. The shares are collected every month (or whatever the time period is fixed) and total money collected is given to one of the members selected randomly each month. It is a kind of share game that helps in promoting savings and provides access to fairly large sums of money that could be utilized for meeting many needs. There may be ways to give financial assistance to poor families alongwith guidance to improve their income and save more.

In allocation of funds by government housing has been a poor competitor. Governments often set very high physical targets in the sector but rarely provide corresponding finances to achieve these targets. At present House Building Finance Corporation (HBFC) is the only agency giving housing loan to the general public. HBFC is operating for quite some time now but has not developed into a housing finance giant. One would expect that HBFC fund will grow and revolve more effectively to extend cover to a large number of households. There is however need to

have additional finances and efficient financial mechanisms/institutions to have a housing fund that will continue to grow and revolve. It is time to recommend that government may establish a housing bank. At present agencies dealing with small plot development schemes are finding it very difficult to borrow money for these schemes. Therefore, creation of a revolving fund for lending to agencies involved in plot development operation, private developers, building societies and associations will boost the housing sector. National Housing Authority seems to be the most suitable agency to operate this fund.

Research Evaluation and Technical Assistance.

Research and evaluation studies in the field of housing in Pakistan are very limited. One finds it very difficult to get good data almost at all levels of Government. What ever research, information and data is available does not reach the hands where it might be used purposefully. The basic research data and research work on housing shortage, replacement rate, vacancy rate and annual

supply of house does not exist, such a lack of information mostly leads to arbitrary decisions based on likes/dislikes and intuition. It is common knowledge that many project did not succeed because there was not enough emphasis to make the prospective beneficiaries aware of the benefits of programme and ways one could have access to such projects. There is an absolute dearth of studies on rural housing arrangements, system, problems and needs. Almost 80 houses are built by people themselves without much of technical assistance and advice, in the process people often end up in wasting materials, time and space.

In view of above situation it will be best that National Housing Authority initiates setting up of a national housing research institute (NHRI) to facilitate and provide conducive research environment. National Housing Authority (NHA) may also establish a good evaluation, monitoring and technical assistance cell initially as a support to its projects and subsequently the service may be extended to the projects being under taken by other

agencies. NHA will have a strong data bank and a pool of resource persons to extend advice, technical training and assistance.

Role of National Housing Authority.

National Housing Authority (NHA) has been recently created through a resolution with major emphasis to facilitate provision of shelter for the shelterless. It is a good step in the sense that a body having autonomous character has come into being to streamline, encourage, facilitate, coordinate and monitor the housing sector in Pakistan. NHA will do a great servicities in housing sector if it chooses to expand its activities namely, building up of a National Housing Resources Center (NHRC), National Housing Research Institute (NHRI) and National Housing Finance Resource Centre (NHFRFC).

NHRC will cover the responsibility of developing national housing data bank with break downs to smallest village levels, it will maintain a pool of resource persons to provide project assistance where ever required, it will take up project preparation and

approval work as well as project evaluation and monitoring and other similar activities.

NHRI will be responsible to conduct research in the field of housing covering, physical planning, design, building materials, construction methods, building regulations, housing need & demand, social, cultural and other indigenous aspects. NHRI will provide short term technical training to people involved in housing research and will also cover the fields of housing

economics, finances and cost recoveries etc. NHRI will be expected to publish a high quality journal of Pakistan Housing, initially this journal can be published annually for the 1st year then it can be brought out twice in a year.

NHFRC will be a vital center because it will manage all the funding issues and will maintain inflow and out flow of funds from the central revolving fund. If in initial experimental stages this center works efficiently and gets itself accepted it can

subsequently grow into a national housing bank.

Above functions of NHA require and extended organization at national level. Although housing from implementation stand point is a provincial subject but above listed functions of national level are supportive to provincial activities. Organizations such as Agriculture Research Council have progressed successfully on these lines. The figure 1. Gives the proposed extension of NHA at national level.



A FAILED STATE?

Pakistan stands at a critical cross road today. It can either emulate its neighbours in the East Asia and become a viable economic entity bringing and sharing prosperity with the masses or gradually turn itself into a 'failed' state where the behaviour of the privileged few sucks away the lifeblood of the economy. The key to success lies in good governance with transparency, accountability and respect for the rule of law.



Modern Industrial System Concepts

* Engr. J.K. Jaffari

Introduction

Industrialization is capability of a country to convert surplus money into capital as agent of industrial production. Surplus money from land, labour, savings of consumers and commercial investments. It is either unproductive or productive. Unproductive surplus money is a source of industrial waste and damages industrial uplifts in three ways. First it provides no stimulus to produce because it is used for personal satisfaction; secondly it takes away a portion of wealth which might have been productively applied to some productive activity. Finally it not merely does not promote actively, it depresses it. It has a negative influence upon production, regarding the growth of industry. Whereas productive surplus has a power to transform itself in the growth of capital for the promotion of industrial activities, obviously it is an essential

tool or indispensable instrument of the industrially advanced countries of the world. It is a capitalistic age and terms are coloured by reference to their place and functions in the capitalistic system and in this system Finance and Bank credits occupy pivotal place.

Finance and Bank Credits

Finance Comprises all industrial business connected with the production, protection and conveyance of money or purchasing power of raw materials, labour and tools of production and with the creation of and dealing in stock shares and other negotiable securities. It is much more authoritative in its general overall modern industry. Industrial enterprises which produce and regulate the supply of financial power remain in business. The forces issuing from finance are operative everywhere throughout the industrial order. A great

banking crisis paralyses all industrial activities as surely and even more completely than a breakdown of any other industrial activity. Finance presents a general connective apparatus between extractive and manufacturing activities as common starting point for a great variety of industrial processes. A large part of the running expenses of a factory for the purchase of materials and wages is provided by bank credits in the form of temporary expenses. This is some times called forced savings. In normal times this bank money thus swells the saving fund and helps to stimulate and maintain the productive processes. It provides means to the distribution of industrial energy on the one hand and of consumable wealth on the other. As it circulates about the system, it is seen bringing labour, capital goods, energy and raw materials to the places where they are needed and

*Chief Engineer (Retd.) Irrigation & Power, Punjab

apportioning the various products to the people working to manage the industrial orderly arrangements with effective management of the finances at their disperse. Similarly commerce plays a significant part in the industrial system.

Commerce

Commercial work is inseparably connected with industrial work. Industry is broken up into parts and parts are united by commercial links. Commercial functions are the buying and selling and taking the industrial goods from one country to the other countries. Every year larger and larger quantities of goods flow across the national frontiers and seek purchasers in foreign markets. The growth of international trade is always kept within bounds by protective tariffs upon imports which the national governments place upon foreign trade for the protection of the production of the industrial goods produced within the country. The industrially advanced countries are activity pursuing the policy to restrict industrial growth in the industrially backward

countries. Recently they have vigorously activated "General Agreement on trade and Tariff" and agreement on world trade for imposition of compulsion on the backward countries to lower down their tariffs on imports of manufactured goods from the industrially advanced countries. In view of this industry is becoming more complex; machine tools, materials and labour are to be drawn from more distant and more numerous places to take part in more delicate and complex processes of co-operation and the commercial working of the system, depending more and more upon rapid and reliable information about the movements and fluctuations in the commercial and industrial world. In this connection rapid means of transport and communication are equally pervasive.

Transport and Communication

In the modern world transport and rapid communication plays a larger and imposing part in industry, absorbing an increasing proportion of capital, skilled labour and presenting the most critical problems related to the

control of industry. Swift transport and rapid communication wield a power over the life, prosperity and industry of the country. Every improvement in transport facilities facilitates improvement in the industry. Break down in the conveyance of the materials in the production processes damages the entire production system. It presents a general connective apparatus between farming extractive and manufacturing activities and conveyance of raw materials to the factories and supply the finished goods to the consumers and common starting point for a great variety of industrial processes. For the same objective the building of network of motorways criss-crossing the country provide the opportunity for setting up of number of large ware houses and small industrial units serving agricultural machinery and equipment, at or near starting point in this communication system. The development of stock holding system by the side of motorways has already made considerable progress in many products in industrially advanced countries of the world on account of availability of basic materials for cottage industries and vendor

industries and the construction and engineering industries. As a matter of fact transport and imposing part in industry absorbing an increasing proportion of capital and knowledgeable persons.

Quality of People

Another important agent of industrial growth in a country is the quality of people. As conceived by the Quran, it is man who is a creative activity. It is the lot of man to share in the deeper aspiration of universe around him and to shape his own destiny as well as that of the universe, now by adjusting himself to the forces, now by putting the whole of his energy to his own ends and purposes. Labour is inseparable from the man. Moral and intellectual qualities increase its productiveness temperance, trustworthiness, skill quick perception, a comprehensive mutual grasp - all these and other qualities belonging to man are of paramount importance. Man's mere physical strength is in itself a poor thing being surpassed by that of lower animals. Evidently where mere physical labour is involved, unskilled man is subjected to most heavy, directly, repulsive, unhealthy labour because

of the over supply of low skilled workers. Trades involving skill, intelligence and responsibilities, generally have higher levels of wages. The productivity and industrial advancement of a country is dependent upon the extent to which skilled and educated people find their way to the work best suited to them, where they learn to live in harmony and forget individualism. They get knit together in high standard of self discipline. Fear of authoritative dictation to them is driven out of their mind and every one work effectively for the better performance for the company. All barriers are removed so that the hourly worker is not robbed of his right to pride of his workmanship.

Rapid revival of industry in Japan has made the Western and American institutions to look into the Japanese systematic investment in people who provide key strength to the Japanese Industry. Japanese workers are educated to participate actively to improve the performance efficiency and meet the needs of modern quality concepts. The concept of total quality management (TQM) has emerged out of it and accordingly everyone in the organisation is directly

involved and committed. The most powerful factor in shaping the industrial development in the country is deployment of the skilled labour efficiently and effectively.

Now it is clearly established that there is direct link between the educational qualifications and technical experience of a nation's work force. It is the spirit of the readiness of the work force to learn from wherever there have been ideas, technologies or practices which can serve the industrial purposes. In industrial effort there is no difference between the scientists, engineers and technologists with theoretical knowledge and skilled workers with practical experience. All of them depend on each other for industrial progress in a country, because they have to move together side by side for continuous industrial progress. There is a need to make sure that all employees in an industrial concern learn as much as possible about the system within which they work and to understand the basic theory behind the work they do. Industry, as it has been previously known, is replaced by knowledge society where the most valuable factor is not land, raw materials or capital, but

information knowledge and intellect.

Knowledge is industry

Establishment of a few single process industrial units is no more an act of industrialism in a country. It is overall function of an industrial state, that coordinate the existing talent of scientists, engineers and the workforce in the factories. It is a most valuable quality of remarkable vision of knowledgable research scholars and highly skilled workforce which institute methods to improve efficiency and performance for bringing meaningful change in industrial system. Their knowledge and experience nurture an effective corporate culture fostering industrial environments which install the proper incentive in the scholars and technicians to use their scientific and engineering knowledge in a manner that open up new avenues leading to industrial advancement. In an industrialized state thinking is creative, it rearranges ideas, bringing things together to provide new insights and possible solutions. Time is not faraway when the new devices now under

development will reshape the industry along unpredictable lines. Electric motors in industrial use, costing a tenth as much will run ten times as long, between over hauls with one tenth the fuel consumption weighing 5lb instead of 500 lb and still developing enormous house-power. Electronics has already become a major industry. It has become the fourth largest industry after food, transport and chemicals. Solid state physics is also creating entirely new tools for the industry. One example is thermoelectric generates which will convert gasoline or propane directly into electric energy, without the intermediately of steam turbines of gas turbines. Physists have already established, that through doping, a highly stable crystal can be created, which will conduct electricity while holding back heat conduction. In this way upto 90 per cent of the heat energy produced will be converted directly into current. similarly in Industry Laser (Light Amplification by the stimulated Emission of Radiation) will certainly be applied to hundreds of tasks now dependent on

mechanical actions. Where we use machines to fabricate and assemble, soon will be using light beams of controllable energy. These same will be used for communication electric power and illumination.

Industry is not something static. It is growing fantastically. we have reached a stage where germanium, gallium and other semi-conductors materials will be used to guide and perform remarkable tasks to meet the industrial challenges of the next century. Engineers Researchs, scholars and economists are busy in strategic planning and they are pre-occupied with the mission and vision in the effort to steer their countries into glorious future, where as unfortunately Pakistan has taken a U-turn to lead its inhabitants to neolithic barbarism. A country in which members of the privileged class will thrive to build Pyramids and monuments within the country and palaces abroad and stifle the knowledgable society to hinder the Industrial growth.

Pollution Load From Urban Runoff: Its Measurement and Abatement

By

Engr. Awais Latif Piracha,

Abstract

Recent studies have indicated that Urban Runoff is a major contributor in stream pollution. Urbanization greatly increases the pollution that reaches the streams. Considerations should be made before development as treatment is difficult. In this paper different sources of pollutants with parameters used for measurement of their determination have been described. A description of the damage to the environment by individual pollutants is then given. An overview of modeling techniques used for routing of pollutants is also given. And in the last section recommendations for urban stormwater runoff quality management are made.

Introduction

Non point pollution sources are those not

concentrated at discrete points. The flow from these sources is intermittent and arise from extensive area. Also the flow is highly responsive to climatic conditions. Urban runoff, arising from the rain storms and other types of precipitation in built up areas, is one of the most common examples of non point pollution sources.

Rainfall and associated runoff loosen, suspend, and then transport those pollutants over the land surface to receiving water bodies. Stormwater, per se, is not a pollutant, but the presence of many suspended pollutants gives stormwater a significant pollution potential. The "first flush" effect of many runoff events may constitute a shock load to receiving streams, particularly during the low flow summer months. The

term first flush applies to the beginning of a runoff event when the volume of overland flow is still small, but the concentration of pollutants is very high. Those pollutant particles lying loose on impervious surface are quickly suspended and transported by the incipient overland flow.

Pollutant concentrations are observed to decrease after the "first flush" of the loose particles until higher volume flows scour compacted particles. For too long it has been accepted that rainfall and consequent increased flow in streams is somehow "diluted" pollution. Recent studies, however, have shown that pollution is not less, and often even worse, during these periods of increase stream flow. (Overton, 1976)

In the following sections a detailed

*Engineer, NESPAK, Environmental and Public Health Engineering Division, Lahore.

description, of the origin, measurement, quantities, damage to environment, and modeling/routing techniques of pollutants in urban runoff, is given. The recommendations how to remedy the problem are also given.

Sources of Pollutants in Urban Runoff.

(a) Transportation

Vehicular traffic contributes more to pollution in urban runoff than any other source.

(b) Construction

The pollutants generated during construction are connected directly to on-going construction activity. During the early site preparation the protective cover is removed and the soil disturbed. Rainfall and consequent runoff erode the loosened earth material and sediment from this soil erosion is the major pollutant identified with construction. In addition the suspended solids, colour, turbidity, and sediments are sources of nutrients and heavy metals that were bound with the soil. The disturbance of the soil generates dust that becomes entrained in air currents and is dispersed

over the construction site and the neighbouring area.

(c) Industry

Many industrial activities contribute significantly to stormwater pollution. Rainfall and runoff leach pollutants from open stockpiles of raw materials, finished products, and process wastes. The spills during the handling of materials and the leakage from the piping systems and corroded storage units add, in par to the accumulation of pollutants on exposed surfaces. Process gases contribute stormwater pollutants either through dustfall or washout. The nature of pollutants from an industrial site is a function of the type of industry. The pollutant that could have serious impact on receiving water bodies include oils, toxicity and heavy metals.

(d) Commerce

Most commercial areas are highly impervious, being comprised of buildings surrounded by parking lots and streets. The pollutants that accumulate on the exposed surfaces are generated by extensive automobile traffic, litter, dustfall, and spills. The pollutants

associated with commercial areas are essentially the same as the pollutants associated with transportation.

(e) Residences

The quantities of pollutants generated in residential areas vary with the population density, the amount of open space, and the general standard of living. The population density affects waste production because more people generate more waste, however, this axiom does not always hold. Because of different standards of living, more often those living in the less densely populated areas can afford more goods and services, and therefore, have greater opportunity for waste production. Organic, bacteria, and nutrients are the most common pollutants in stormwater from residential area. Their sources are litter, tree leaves, and human and animal excreta. In addition fertilizers, pesticides and herbicides from lawns add to the problem.

Measurement of Pollutants in Urban Runoff

The test carried out for measurement of

pollutant in urban runoff are essentially the same as that for municipal and industrial wastewaters. A list of commonly used parameters and the pollutants they measure is as follows;

(a) Biochemical Oxygen Demand (BOD)

BOD (Biochemical Oxygen Demand) measure oxygen demanding substances that can be metabolized by the bacteria. A measure of biodegradable organic matter if properly performed.

(b) Chemical Oxygen Demand (COD)

COD (Chemical Oxygen Demand) measures oxygen demanding substances that react with an oxidizing chemical in a heated acid bath. Designed to measure organic matter but also measures reducing inorganics.

(c) Total Organic Carbon (TOC)

TOC (Total Organic Carbon) measures oxygen demanding substances that are organic. It is very speedy and reliable but does not give any clue to the biodegradability of the runoff.

(d) Total Suspended Solids (TSS)

TSS (Total Suspended Solids) are a measure of non-soluble material in the urban runoff.

(e) pH

It gives the hydrogen ion concentration which is measure of acidity or alkalinity of a water.

(f) Most Probable Number (MPN) or Membrane Tests

These tests are used to measure total coliforms in water. They are used to get the indication of microbial contamination of a water.

(g) Oil and Grease

A measure of specific group of organic materials. This test gives an indication of how much petroleum products are there in urban runoff.

(h) Heavy Metals

Different heavy metals can be measured by different techniques. Atomic absorption spectrophotometry, however, is the most common method employed.

Damage to Environment by Pollutants in Urban Runoff

Pollution of fresh water resources almost always effects adversely any potential downstream consumptive uses. Polluted runoff causes following problems:

- i) Poses a threat to public health, particularly in case of consumption or body contact.
- ii) Increases the cost of treatment for downstream water supplies.
- iii) May not be suitable as industrial process water.
- iv) May not be suitable as agricultural irrigation water
- v) Impairs or destroys the aquatic environment and biota.
- vi) Is not acceptable aesthetically (Overton, 1976).

The damaging effects of some of the individual pollutants in urban runoff are described below;

(a) Toxicity

An extensive field monitoring and laboratory analysis program was conducted by American Federal Highway Authority ((FHWA) as a part of a study that lasted for 15 years (from early 70's to 1989). Acute-toxicity bioassays were performed using undiluted runoffs.

These bioassays were conducted to simulate worse-case shock loadings on the receiving waters for duration of no more than several days. Bioassays were run on alga, water flea, amphipod, isopod, mayfly, and flathead minnow. These bioassays clearly demonstrated that the pollutants in urban runoff cause considerable damage to aquatic life. (Smith, 1990).

(b) Heavy Metals

Heavy metals are conservative substances that may undergo biological magnification in the food chain. At increasing concentrations, many of the metals become toxic, to human beings, livestock, and wildlife.

(c) Nutrients

Nitrogen and phosphorus are the main nutrients found in urban runoff. Presence of these nutrients in water can promote algal blooms. The excessive algae dies later on and hence increases the organic load on water. In extreme cases the water bodies may even become anaerobic hence killing most of the aquatic life. Excessive amounts of algae also causes problems for

water treatment. Due to its low density it does not settle properly. Toxic blue-green algae may also grow as a result of presence of nutrients in water.

(d) Suspended Load

Suspended particles carried by urban runoff make receiving water bodies murky. Sunlight penetration is reduced and the performance of plants under water is affected. Less amounts of oxygen is generated and in acute cases aquatic life may be endangered. Suspended load also causes problems for water treatment plant operators downstream, as they have to deal with higher amounts of turbidity.

(e) Organic Wastes

Organic wastes in urban runoff consume oxygen from the receiving bodies hence threatening the aquatic life. A dissolved oxygen level of at least 4mg/l is essential for survival of fish. The first flush of urban runoff especially during the summer months of low flow may decrease the dissolved oxygen level below the above mentioned critical limit.

(f) Oil and Grease

Oil and grease may form a thin layer on the surface of receiving water body. This layer prevents transfer of oxygen. The receiving water body may become anaerobic and aquatic life damaged.

(g) Bacteria

Urban runoff contains large concentrations of bacteria, viruses and pathogens, and with high sediment-water bacterial ratios, these micro-organisms accumulate in benthal receiving waters and has implications in terms of public health and recreational use. (Ellis, 1986).

Modelling/routing of Urban Runoff Pollutants

Modeling of urban runoff can be subdivided into two parts; i.e. deterministic modeling of urban runoff processes and the receiving water modeling. These two categories of models will be dealt with one after the other.

(a) Deterministic Modeling of Urban Runoff Processes

Operational implies 1) a user's manual and documentation, 2) use by other than just the model

developer, and 3) continued support, usually by government agency. These operational urban water quality models are deterministic in the sense of predicting water quality by means other than regression or simpler assumptions. (Huber, 1986)

All of the models listed in table-originated on large "main frame" computers. However this is no longer routine requirement with the current explosion in micro computer population and capabilities. For example SWMM and STORM have been adapted for microcomputers.

If we look at the limitations of these models, they can by no means perform all the tasks that a study might need. None of the models simulates physics or chemistry from the first principle, except in the cursory manner for particle settling, for instance. In particular, the process of buildup and washoff are represented in models almost wholly in an empirical fashion. Although erosion estimates have some basis in theory, they still must rely upon

calibration for parameter estimates. As long as this is borne in mind, the models can be used successfully, given adequate data.

(b) Receiving Water Modeling

Following are some of the examples of models used for routing of pollutants in the receiving water bodies.

(i) Reach File System

Though the system, described below, is for the United States, the principles involved can be used as basis for development of similar system for other places.

Reach File is a network-oriented, spatially referenced geographic database of surface water features developed by the Environmental Protection Agency of the United States between 1988 and 1990. It has been designed to serve as foundation for water quality modeling and for storing and using stream information.

In Reach File the connectivity of each branch to its adjacent reaches is known along with the characteristics of the reach. It has information for about

5 million km of streams and many thousands of reservoirs, lakes and ponds. All this data is stored in graphic mode as well.

With the type of data provided by reach file it is possible to analyze urban runoff pollutant discharges described in one file with respect to downstream domestic water-supply intakes found in another file, and to further associate these analyses with data from water quality monitoring stations found in yet another file. Furthermore, hydrologically ordered retrivals from multiple water-resource files are ideally suited for water quality modeling because they can provide needed data in the same sequence required by the models as the simulation progresses downstream from points of origin to the final sinks.

(ii) Routing and Graphical display System

The routing and graphical display system (RGDS) is a data-centered modeling and display system developed for use in assessing the water quality of streams and other water bodies. It consists of a modular set of files and programs that form a

framework for water quality modeling and display. This framework can accommodate a variety of different water-quality and hydrological models. The major components of RGDS and their interaction are described below:

- i) The Reach File.
- ii) The Catalogue Unit file, which contains data on rainfall and runoff.
- iii) The Industrial Facilities Discharge File.
- iv) The Guage File which contains flow estimates for each reach.
- v) The Reach Trace File which contains the coordinate strings needed for plotting.

RGDS uses a steady-state, first-order decay model. It is designed to assist in screening the more significant water quality problems (and their causes) from less significant problems. Discharge loadings to stream are determined based on effluent flow data. RGDS routs these loads through the stream network defined in Reach File, calculating in-stream concentrations in reach and saving the calculated results in an auxiliary file for subsequent processing. Flow estimates, available for each

reach from the guage file, are used by the model in the routing. Time of travel estimates are calculated based on a statistical relationship between velocity and stream flow and stream order.

Recommendations for Urban Stormwater Runoff Quality Management

Quality management of storm-generated urban runoff can be accomplished in a number of different ways. Measures can be taken upstream of the collection system (source control), in the collection system (in-line and off-line control) or at the downstream end of the collection system (downstream control).

Control measures can basically be of three different kinds.

- i) Structural measures.
- ii) Semi-structural measures.
- iii) Non-structural measures.

As indicated by the name, structural measures include those measures where a new structure is built into the drainage system. The construction of storage basins and treatment facilities are examples.

When semi-structural measures are involved, it is in most cases a matter of installing some form of regulator device in the system which requires only a limited amount of construction work.

Non-structural measures do not involve any building activity at all. Instead they are preventive in nature, such as street cleaning to reduce the pollution load in the stormwater or sewer flushing to reduce the first flush effect. (Stahre, 1986)

Pollutants can be removed at the source by land management, in the collection system, or offline by storage. They can be removed by treatment and by employing integrated systems combining control and treatment.

(a) Land Management

Land management includes structural, semi-structural, and non-structural measures for reducing urban and construction site stormwater runoff and pollutants before they enter the downstream drainage system. Various concepts have been fostered, including.

- i) Land use planning
- ii) Natural drainage which will reduce drainage costs and pollution, and enhance esthetics, ground water supplies, and flood protection.
- iii) Retention and drainage facilities, and other management techniques required for flood and erosion control which can be simultaneously designed for pollution control.

Retention on-site or upstream can provide for the multiple benefits of aesthetics, recreation, recharge, irrigation, or other uses.

Porous Pavement.

Porous pavements provide storage, enhancing soil infiltration that can be used to reduce runoff. Porous asphalt concrete pavements can be underlain by a gravel base course with whatever storage capacity is desired.

Surface Sanitation.

Maintaining and cleaning urban areas can have a significant impact on the quantity of pollutants washed off by stormwater. Tests under real-world conditions in San Jose,

California, showed that street cleaning can remove upto 50 percent of the total solids and heavy metals in urban stormwater with once or twice a day cleaning. (Field, 1986)

Chemical Use Control.

Highway de-icing efforts need careful consideration. Problems of sloppy salt storage practices and overapplication should be solved.

(b) Collection System Controls

Collection system controls refers to management alternatives for stormwater interception and transport. These include: improved maintenance and design of catch basins, sewers, in-sewers and in-channel storage, elimination of sanitary and industrial cross-connections, and remote flow monitoring and control.

Catchbasins.

Catchbasins are potentially quite effective for solids reduction. Removal of associated pollutants, such as chemical oxygen demand and biochemical oxygen demand are also significant. To

maintain the effectiveness of catchbasins for pollutants removal requires cleaning probably twice a year, depending upon conditions.

Regulators and Hydrobkes.

At Present, there is a strong need to develop and to have a reserve of control hardware for urban runoff control and to effectively reduce the associated high cost implications for conventional storage tanks, etc. The dual functioning swirl flow regulator/solids concentrator has shown outstanding potential for simultaneous quality and quantity control. (Field, R. 1977) A helical type regulator/separator has also been developed based on principles similar to swirl.

These methods of stormwater control may be more economical than building huge holding reservoirs for untreated runoff, and offer a feasible approach to the treatment of separately sewered urban stormwater.

(c) Storage

Because of high volume and variability associated with stormwater, storage is

considered a necessary control alternative, and is the best pollution abatement measure. Project results and theory indicate storage must be considered at all times in system planning, because it allows for maximum use of existing dry-weather and other treatment plant facilities and results in the lowest cost in terms of pollutant removal.

Storage facilities may have auxiliary functions, such as sedimentation treatment, flood protection, sewer relief, flow transmission, and dry weather flow equalization.

Storage concepts investigated include the conventional concrete holding tanks and earthen basins and the minimum land requirement concept of tunnels, underground and underwater containers, underground 'soils', natural and mined under and above ground formation, and the use of abandoned facilities and existing sewer lines (Field, 1975)

(d) Treatment

Due to the adverse and intense flow conditions and unpredictable shock loading effects, it has been

difficult to adapt existing treatment methods to storm-generated overflows, especially the microorganism dependent biological processes. Physical/Chemical treatment techniques have shown more promise than biological processes in overcoming storm shock loading effects. To reduce capital investments, projects have been directed towards high-rate operations approaching maximum loading.

Storm-flow treatment methods which have been demonstrated include physical-chemical, wetlands, biological, and disinfection. (Pitt, 1982) These processes, or combination of these processes, can be adjuncts to the existing sanitary plant or serve as remote satellite facilities at the outfall.

Physical/Chemical

Treatment. Use of physical processes/systems with or without chemicals, such as fine mesh screening, swirl degritting, sedimentation, and dissolved air floatation, has been successfully demonstrated. Physical processes have been shown to be important for storm-

flow treatment because they are adaptable to automated operations, rapid startup and shutdown, high-rate operations, and resistance to shock loads.

Disinfection.

Because disinfectant and contact demands are great for storm flows, research has centered on high-rate applications by static and mechanical mixing, higher disinfectant concentrations, and more rapid oxidants, i.e., chlorine dioxide, ozone, and ultra violet light; and onsite generation. It has been demonstrated that adequate reductions of fecal coliforms can be obtained with contact times of two minutes or less by inducing mixing and dosing with chlorine and/or chlorine dioxide.

(e) Integrated Systems

The most promising and common approach to urban storm flow management involves the integration of control and treatment. Integrated systems are divided into storage/treatment, dual-use wet-weather flow/dry-weather flow facilities, and control/treatment/reuse.

Storage/Treatment.

When there is storage, there is treatment by settling, pump-back/bleed-back to municipal works, and sometimes disinfection. In any case, the break-even economics of supplying storage must be evaluated when treatment is considered. All of these storage/treatment concepts have been demonstrated at full scale.

Dual-Use Wet-Weather Flow/Dry-Weather Flow Facilities. The concept of dual-use involves maximum utilization of dry-weather facilities during storm flows. Full-scale dual-use or high-rate trickling filters, contact stabilization, and equalization basins have been demonstrated to work well.

Control/Treatment/Reuse.

Control/treatment/reuse is a "catch-all" for all integrated systems. A prime consideration should be various nonstructural and land-management techniques. A study of the reuse of urban stormwater for potable, industrial, and irrigational water supply purposes indicated that the stormwater would be less expensive than municipal potable water. (Field, 1981).

REFERENCES

- Ellis, B. J. (1986) "Pollutional Aspects of Urban Runoff" in "Urban Runoff Pollution" ed. Torno, H. C., Marsalek, J., & Desbordes, Michel, Springer-Verlag, Berlin.
- Field, R. (1986) "Urban Stormwater Runoff Quality Management" in "Urban Runoff Pollution" ed. Torno, H. C., Marsalek, J., & Desbordes, Michel, Springer-Verlag, Berlin.
- Field, R., (1975) "Urban Runoff Pollution Control: State of the Art" Journal of the Environmental Engineering Division, ASCE 107(EEL): 171-189.
- Field, R., et al. (1977) "Treatability Determinations for a Prototype Swirl Combined Sewer Overflow Regulator/Solids Separator." Progress Water Technology 8:81-91.
- Huber, W. C., (1986) "Deterministic Modelling of Urban Runoff Quality" in "Urban Runoff Pollution" ed. Torno, H. C., Marsalek, J., & Desbordes, Michel, Springer-Verlag, Berlin.
- Overton, D.E., (1976) "Stormwater Modeling" Academic Press, New York.
- Pitt, R. E., (1982) "Sources of Urban Runoff Pollution and its Effects on an Urban Creek" Report No. LPA-600/S2-82-090, United States Environmental Protection Agency.
- Smith, D.L. (1990) "Highway Water Quality Control: Summary of 15 Years of Research". Transport Research Record
- Stahre, P., (1986) "Structural Measures for Runoff Quality Management" in "Urban Runoff Pollution" ed. Torno, H. C., Marsalek, J., & Desbordes, Michel, Springer-Verlag, Berlin.
- Whipple, W. et al, (1983) "Stormwater Management in Urbanizing Areas" Prentice Hall Inc., Englewood Cliffs, N.J.

PUNJAB IRRIGATION DEPARTMENT - THAT WAS

BY

**Engr. Khalid Faruq*

At the time when Punjab was annexed by the British in middle of the 19th century, it presented a desolate picture of uninhabited plains with scattered wild growth, sparsely inhabited by wandering nomadic tribes roaming in search of grazing grounds for their flocks of cattle, eking out a hardly subsistence living. The comparatively better inhabited places were plagued by murder, looting and plundering by the marauding gangs of disbanded Sikh soldiery and other bandits. However the lay of the land and abundant water running through six mighty rivers presented an ideal setting for developing an irrigation system. The British, with all zeal and diligence set themselves to create a network of irrigation canals fed from numerous head-works structures thrown across the rivers. After facing many failures and frustrations and through

relentless and persevering efforts a mighty and truly magnificent irrigation system, which was unique in the world, was created. This grand system while providing lively-hood to the millions, converted erstwhile desert wastes into lush green fields dotted by habitations of peaceful peasantry, which was a great boon for the new colonial power seeking to establish its writ in the land.

The irrigation system was not only pride of the British Empire but also proved to be a massive and lucrative source of revenue earnings for the government. It was the utmost effort of the government at that time to devise a befittingly efficient machinery to manage, operate and develop this unique system. It was realized that the Irrigation Department had to constantly battle against the unpredictable elements

of nature such as wind and rain storms, fury of mighty rivers in spate threatening population centers agriculture lands and colossal hydraulic structures of the Irrigation System. In those days there was much stress on discipline in all fields of government business and conformity to form and spirit of the rules was a *sin qua non*. The normal concepts of management, budgeting, expenditure control etc. were considered too deficient and tardy to enable the department to acquit itself competently of its onerous duties. The position was further compounded by the fact that the construction of hydraulic structures and distribution system of a magnitude unprecedented in the world was a venture beyond the frontiers of knowledge then existing. So the Irrigation Department was accorded a unique and privileged position among all the Departments of the

*Chief Engineer (Retd.) Irrigation & Power, Punjab

province. One may recall some of the special features of the Irrigation Department.

It was realized that the constant, close and highly technical attention that this Department warranted, was beyond the span of control of one single person, so quite contrary to the normal concept of one secretary at the head of one Department, a unique arrangement of providing four secretaries to head the Irrigation Department concurrently, was adopted. To further enhance their efficacy the four Secretaries were also made Chief Engineers. All the four Secretaries-cum-Chief Engineers were located at Lahore and had a somewhat vague territorial - cum - functional jurisdiction. With increase in work load, a fifth post of Secretary-cum-Chief Engineer was also created in November 1946, which post, however, was not filled due to partition of the country immediately thereafter.

This was not merely a symbolic gesture, when the Secretaries of Irrigation Department were housed in a beautifully constructed

multistoreyed building away from the main Secretariat of the Punjab Government which was housed in the barracks vacated by the British forces.

Despite the much quicker pace of disposal of inter departmental matters in those days, the imperatives of quick processing of financial matters and issuance of timely financial sanctions for the Irrigation Department were also fully realized. In pursuance of this requirement, another innovation of bringing the Finance Department at the door steps of the Irrigation Department was adopted. A Deputy Secretary of Finance Department alongwith the appurtenant staff was housed in the Irrigation Secretariat. Instead of having to issue formal letters to the Finance Department and receiving formal queries and sanction, the Irrigation Department files were directly marked to the Deputy Secretary (Finance) for processing. Any queries or clarifications were mostly settled in informal discussions. This in-house arrangement resulted in very expeditious disposal of important and urgent cases.

Notwithstanding strict instructions prohibiting incurring of expenditure on works without a budget provision and sanction of estimate, a Divisional Officer of the Irrigation Department "Whether on grounds of emergency or otherwise" could take up works "...for which no financial provision exists (whether estimate has been sanctioned or not)..." (PARA 2.89 PWD CODE)

In a similar provision in para 1.67 of the PWD code the above position is reiterated while strictly prohibiting the Divisional Officer to commence any work or to incur expenditure without the sanction of the competent authority or to deviate from the sanctioned design, an exception has been made that such prohibition would not apply in the case of an emergency.

A detailed and transparent procedure for calling and approving tenders for execution of works, is laid down in the Irrigation Manual of Orders (para 6.1). However, here also, at the end there is an overall rider that "Nothing in the above rules shall restrict an officer's responsibility to

undertake works in an emergency."

Despite the recognized sanctity of private property, in the case of an accident happening or being apprehended to a canal, a Divisional Canal Officer or his agent is authorized under Sect 15 of the Canal Act, to "...enter upon any lands adjacent to

such canal, and execute all works which may be necessary for the purpose of repairing or preventing such accident". Ofcourse a provision is made for paying adequate compensation after the execution of the emergency works, to the persons suffering any damage in the process.

Bereft of all the tools for efficiently running and

maintaining this grand irrigation system, the Irrigation Department has been relegated to the role of just a routine Department with the logical disastrous results that we are now witnessing. The whole system is at the verge of liquidation and being broken up into small "principalities" under a number of "water lords".



AID IS GOOD BUSINESS

The study found that Australian aid to Indonesia totalling US\$ 900 million from 1980 to 1993 generated US\$ 1.6 billion in incomes to the Australian economy. It means that when the country decides where to allocate its aid, it is decided not on the basis of communities who need the assistance but on the basis of benefits to Australian business.



PAKISTAN AT THE THRESHOLD OF A VITAL DECISION

by
Tariq Ikram

Pakistan is today at the threshold and must make a choice. Should it become a manufacturing base exporting to the world, or by establishing itself as a trading economy import its needs from the regional countries and the rest of the world. Successful examples of both are available in the world today.

The decision lies in the combined Vision, Wisdom and Actions of the government and of the private sector, both foreign and local. It is here that chambers like the Overseas Chamber play a vital role. Let us first examine the elements of this competitive world environment, which are likely to influence us.

Progress is Relative

The world is shrinking, and fast. The time span of change for the better is progressively reducing. While the UK and

USA may have taken centuries to get where they are, Japan, Malaysia, Thailand and now Taiwan and Korea have taken progressively lesser time. Pakistan has little time left with the neighbouring economies heating up at 7% to 10% annual increases in GDP, and the industrial investment and production increasing at an unprecedented rate. Pakistan appears to be running fast judged by its GDP growth. However speeding as we may be on the autobahn of economic development, the other South East Asian countries, notably Malaysia, Taiwan and Korea, who were well behind us, are whizzing past. Where and why we have actually lost ground is the subject of every drawing room conversation. This however does not support my optimistic (but not blind) disposition. Pakistan has indeed also

progressed. Apart from the well-quoted improvements in the macro financial and social indicators, anyone who has experienced Karachi of yester years or suffered the agony of making a trunk call' or blown endlessly at one end of the phookni to light the wood fire, or waited patiently for years to get a telephone connection, and much more, will bear me out. Progress, in this dynamic Asia Pacific Region and the world at large, however is relative. Even today, measured by the HDI (!) Pakistan was 0.483 and it ranks 128th out of the 174 countries. The need for taking this vital decision, ensuring the required commitment and taking decisive action is therefore urgent. And, these must be born out of a Partnership for Growth between the private sector and the government.

Development Finance

Developmental Aid is changing its 'colours'. Benefit to the donor countries of International Aid is being questioned. US the major donors to World Bank is likely to cut back its contribution by 40% can other major donors be far behind? Aid is being replaced by multilateral loans as an equally powerful tool of 'influencing' foreign policies and 'guiding' economic reforms of developing countries. Thus while the megafunds will continue to be available, the cost of these to the developing countries is increasing, ballooning the budgetary deficits and debt servicing which are already crippling our ability to invest behind the improvement of our vast populations.

Corporate Engineering

MNCs are synergising their international resources to increase competitiveness and maximise productivity. With reduced import tariffs manufacturing is being assigned to the most lucrative and cost effective and sale 'locations' (as opposed to each country), and the rest of the regions/world would be the recipient of goods. Factories are closing down in Europe,

US and Japan to relocate into single 'focussed' factories to benefit from the economies of scale. The South Asian region has remained isolated from this so far, due to high tariffs and political barriers. These are now fading away. Opening up of trade between India and Pakistan appears to be only round the corner. Pakistan can soon expect to be faced with open competition and it is not difficult to visualise the pressure of this on our industry. Is our government and private sector prepared? Government policies cause it, and our industry groans at changes in cotton prices, 'sick units' are proliferating, Afghan transit trade hurts us no end, we complain of being on competitive in the electronic and white goods industry and our exporters are basking unmindful of the future in the profits (supported by subsidies) of non value added exports of our precious cotton, rice, vegetables and raw leather.

Resources

Insufficient resources with the governments result in pressure being applied to reduce subsidies increase costs of utilities, petrol etc. This in turn increases the cost of production making

the exports un economical. Devaluation of currencies is undertaken which results in a vicious cycle in import based economies like Pakistan. Alternatively business profits are depressed again making the country less attractive as a location for setting up manufacturing. On the other hand increasing costs to local consumers reduces their buying capacity restricting the growth of the middle class so vital to a prospective investor.

Costs of Business Operations

Compounding the issue is the world pressure for reducing protectionism and tariff barriers, strengthening human rights (leveraged by the issue of child labour), and clamouring for environmental and intellectual property rights, to mention a few imperatives. These while good in logic, are resulting in increased competition on the one hand and higher cost of production on the other. Being an import based economy, falling value of the Rupee adds fuel to the fire. Over protective labour laws in Pakistan that do not encourage productivity shy

away investment despite lower wages.

DFI

Most of the recent Foreign Investment has been in infrastructure and portfolio investments. While this is welcome at our present stage of development it must be noted that unlike other developing Southeast Asian countries, (despite their infrastructure weaknesses), Pakistan is still not attracting DFI into industry). The large MNCs do not find Pakistan sufficiently attractive to locate the production of their machines/capital goods, shoes, computers, TVs, garments, toiletries, crockery. etc. etc. Only when this happens will our industrial base expand rapidly, resulting in the development of the secondary/service and capital goods industries, increase in value added exports, provision of jobs to millions, and achievement of a revolutionary transformation of the country. With the political and tariff barriers are diminishing, and the MNCs recarving out their regions, it is imperative that we move fast. Once the MNCs have invested in

neighbouring countries it will be most difficult to get them to re-transfer to Pakistan. If Pakistan misses the boat today, it must contend itself with becoming a trading base. This would be most unfortunate for a country with 120 million of population in need of, and with the capable of significantly better standards of existence.

For products not commanding significant value addition from protectable technologies, the developed countries are likely to shift their production to lower cost areas of the world in the next half a decade. Japan that was once a textile producing gaint has negligible textile industry left with names like Mitsubishi having totally changed their business visions and definitions. Only about 10% of the Japanese production is currently being under taken outside Japan. This, compared to a third for the US and almost 40% for Europe suggests that Japanese investment abroad is likely to be significant in the future. Very little of this has yet been made in Pakistan. Does Pakistan offer a

competitive edge to attract this investment?

Road Mapping

In almost every nation that has undergone a major industrial change, one characteristic is common. There is a clearly and succinctly stated Vision supported by commitment to it by the government, business community, and people in the street. Leadership and Teamwork have caused this to be translated into commercial reality. Whether it was the US or Taiwan or Singapore or now the Malaysian Vision 2020, the government and private sector are in true 'Partnership for Growth'.

Low cost of production

Local chemical and capital goods industry needs to be strengthened to compete with India. Again incentives to these industries need to be such that they can export ex-Pakistan as in itself the market is not large enough to make such basic industry feasible.

Devaluation has hit us badly as have the various duties, tariffs and local octroi etc., on raw packaging and capital goods. The rising costs of

energy and the rest of the infrastructure are also hurting and we are fast getting into a situation where our own manufacturers will prefer to import. This is coupled by the fact that having lived in a protected environment, our management skills and practices have rusted. Our efficiencies even in the MNCs need to be significantly improved. Lower cost of production can and has to be the major competitive edge. This is possible, in addition to the above, if our labour laws could be made more fair for the employers based on the encouragement of productivity.

Strategic Business Priorities

Having looked at our competitive strengths and weaknesses let us now look at the strategic Business Priorities that can make Pakistan a major player in 4 years. This, in my view, is a 5-point agenda.

1. Development of an Enlightened and Consistent National Business Vision, Strategy and Action Plans

Since independence the National Vision has varied significantly, in spite of the 'five year plans' and

"Decade's" of development. From a debate soon after 1947 of whether Pakistan should be a secular state as wanted by the Quaid or a more Religion oriented one, to rapid pursuit of industrialisation and agriculture under Ayub Khan, to a socialistic benevolent state under Zulfiqar Ali Bhutto, to the present drive for an open liberal economy based on private enterprise. It is therefore little surprise that investors dig deep to establish the credibility and likelihood of the continuation of the present Vision of Pakistan.

Complicating such perceptions are the provocative statements of the opposition, instances of alleged political victimisation, bureaucratic actions (as opposed to intent) of inconsistent policies and disregard of the sanctity of the private sector capital; Cellular telephony was banned WITHOUT any compensation to those who trusted the word and made huge direct foreign investment; incentives given to the SIZs were withdrawn after investment had been made based on declared government

policies; Fiscal year for all industries was changed to July June. In all of these the private sector, reads "hidden agendas" and inconsistency of the application of the declared Vision.

At the highest level a Business Vision for the country needs to be succinctly started and committed to. Policies must then be insulated from political uncertainties. This will only be possible if all sides of the political divide agree on a common base agenda in the interest of the accomplishment of a shared Vision. The political 'manifestos' and 'wins' would then provide concepts and alternative strategies to better deliver The Vision NOT another Vision! This is not a 'dream' or enunciation of a 'utopia'. 7/10ths of this is already there as manifest in the continuation of the macro economic policies in spite of the recent changes of the governments. However we must motivate, discuss openly and declare the commonality which the common man is desperately wanting to support.

In my humble view, the Business Vision for Pakistan

in the context of the current world and regional environment should be.

To be the most attractive location for investment in the South and west asian region, by year 2000

As will be obvious all related national priorities, policies and attitudes will begin to radiate their from and our social economic political and cultural strategies and actions would start getting aligned. It is however critical that such a Vision be nationally and widely debated and a nation consensus be arrived at. Even a referendum would be in order. Yes, to the cynicall will admit that this is indeed aspirational in the context of the current state of socio, economic, political realities on the ground and the degradation of moral values, and seemingly impossible but then so was the landing of the man on the moon half a centurty ago! I would like to quote Jack Welch, the CEO of GE, who warned that " if the rate of change within an organisation is less than the rate of change outside, the end is in sight". We do not need our leaders to become 'sadhoos' or buddhists' in the name of integrity and expect them to renounce the goodness of life to

achieve this. We need commitment, dedication, leadership and transparency in actions, with the whole country owning and chasing an agreed focal point in year 2000. We need a mindset change' we need a Paradigm shift!. The country is full of people dedicated to the cause-we need to look for them by breaking through the barriers of tradition and rising above our immediate compulsions, needs and necessities.

2.Resources/Documentation of Economy

To chase any ambitious vision various resources are required. The most critical in our case are the Financial Resources (including foreign exchange), because our debt servicing and defence needs consume just about everything we generate, leaving us at the mercy of international forces. The cumulative borrowings of the Government both domestic and foreign now represent nearly 83.5% of GDP. To be accepted as the best location for business investment, resources are required for the following as a priority.

a) Providing the capital for setting up business enrterprises. This country expects to achieve a minimum growth rate of 5% in the GNP every year. This amount of growth is estimated to require a yearly investment of Rs.350 million which is about 19% of GNP. Since domestic savings are presently only 14% GNP, there is a shorfall of investments to the extent of 5% GNP, a sum of Rs.90 billion, which is currently met from foreign inflow of funds. Ofcourse a higher growth rate will need even larger sums.

b) Development of the infrastructure. To counter the competitive edge that India and China offer, of large markets, we must align with Iran Iraq CLS and other West Asian countries. Together we offer a markert to over 300 million people and a fast growing middle class. As an exporter to these countries who need goods and services today valuable foreign exchange could be earned and experience gained to compete in the rest of the world markets.

c) Buying technology to prevent reinventing the

wheel. Time is short and our industry should be encouraged to learn from the experience of others to build upon. Greater MNC alliances should be encouraged in a structured manner.

d) Reduce our debt to reduce debt servicing thus allowing ourselves to invest behind paying our bureaucracy significantly higher salaries to bring them to at least 1947 levels after grossing up for inflation. This will minimise the desperation for corruption and provide resources to invest in their training and facilities in modern management.

e) Providing high quality education (as opposed to only mass education) to have 'managers' to take us forward, in both the government and business.

f) Defend our country at a cost which strategy and circumstances dictate.

The above is not meant to be exhaustive but only indicative of the focus of the utilisation of resources that will demonstrate to investors that Pakistan is better than its neighbours to invest in. Much of this is

known, perhaps not with the focus reflected above.

To achieve this however, while various recommendations are available, in my view, the critical & essential first step is the Documentation of our economy. It is the backbone of resource generation and has not been taken up as comprehensively as is necessary. Nor, with sufficient will and determination. It needs to be taken on a 'war footing' and irrespective of any compulsions must be enforced. To minimise reaction from vested interests the nation needs to be taken into confidence and communicated with regularly, to say what and to what benefit are the actions being taken. Transparency of the bureaucracy will be critical and must be enforced, without compromise, since those who pay taxes must also see that monies so collected are being utilized appropriately for the welfare of the people. Again, documentation of economy is not utopian thought.

We need to establish a high powered body consisting of the Federal Secretaries of every

department to attack the problem in a comprehensive and aligned manner. This body, to receive its due attention must be chaired by the Prime Minister; with like minded trade bodies and senior members of the private sector as members. Facilitated by the best management experts, this body must be challenged to develop a comprehensive Visionary Plan of Action which builds upon all previous plans and coordinates them. These must be then agreed in the Provincial/National Assemblies and then pursued relentlessly.

In my view this is as important a matter as the formation of the 'Board of Investment' or the 'Energy policy' etc. The vast sums of money floating in the undocumented economy, both within and outside Pakistan, must be accounted for and tax collection (of all kinds) at the existing rates, ensured. I am, like most others confident that our Budget deficits can be wiped out on this account alone. The tax paying base will increase allowing for plans to be developed to build upon it.

The benefits of this to the "paying" industrial segments is enormous. A more level playing field would be available to compete in. The business levels of the 'paying' sector will increase in turn increasing government revenue. For example the contribution of the textile sector to the GDP and Revenues are presently disproportionate. The effect on DFI will be salutary in enhancing confidence.

As revenue generation increases, tax levels will be more easily lowered. This will please the common man, industry and make it easier to attract new assesses. For new investors, local and foreign, it will mean a relatively shorter payback providing Pakistan with another competitive edge.

Lower tax rates will mean lower prices of goods produced for a given level of profit. This is what synergising MNCs and exporting businesses are looking for. Real reduction in costs, may it be taxes or labour or cost of raw materials of machinery, brings the competitive strengths to generate

exports, not just devaluation.

Whilst on the subject of Revenue it would be appropriate to mention the second major source. This is the much discussed Agriculture or Farm tax. A quarter of the country's GNP cannot remain untaxed. The Provincial governments must raise their revenues from this source, reducing the burden on the federal exchequer and financing the various developmental plans in their provinces as developed and coordinated at the Federal level for pursuing national priorities. An incentive to the Provincial government should be to be able to retain all of the proceeds of Agriculture taxes raised in the province. This will also be an incentive to accelerate the rate of growth of agricultural produce. The consequent higher price to the consumer of the agricultural produce, be countered by ensuring higher yields with modern farming and technology. It is a pleasure to see that the government is taking action in this respect. Efforts should be made to induct foreign investment, and therefore, excellence in farm

management to use the technology. Pilot projects, if set up, will snowball very soon as the farmers see yields and earnings improving inspite of taxes.

3. Transparency/Independence and Efficiency of the Judicial System

Lack of transparency plagues our streets and institutions. This is not limited to the bureaucracy but the private sector as well. It penetrates the very fabric of our society and social norms. How many homes have managed driving licences for their children under the age of 18, how many will enjoy meals at restaurants and pay without a bill, as it means avoiding excise duty payment, how many have unlicensed TV sets at home, how many believe that taxes must be avoided because the government is not returning value for money in terms of social services, how many even go so far as to argue that since Zakat has been paid, Islam does not require further taxes hence these must not be paid and yet complain of corruption amongst others! We have this great tendency to wish a perfect world for the others. Let me however

remain with our business concerns.

Currently, lack of transparency is a major issue in most South East Asian economies. If Pakistan can be seen as a country seriously doing something about it and moving in the right direction it will be a considerable competitive edge. This is summarised in what Mr. Victor Fryling the CEO of CMS of the USA (one of the bidders in the Kot Addu power project) said to me "I do not mind failing in the bid because I can always come back again. What I must know is that I lost a fair battle, a transparent battle. Otherwise I have no reason to try again as I know that I will lose again, irrespective of my bid."

The question is what can we do. There is no magic wand. I believe that the independence and availability of an efficient judiciary is a vital and the most basic essential need. From its nucleus, it will radiate increasing levels of transparency in the whole environment. Today, 50% of the corruption is caused by harassment even where the legitimate is to be done. Such aggrieved would seek

redress of the court if they knew that justice will prevail and delivered within 3 months!. The other 50% will progressively follow. There must be an institution in the country which the investors can turn to. The benefits are far reaching. It will help politics and democracy mature faster, it will help bring efficiency into our government owned service and industrial sectors, it will help clean up our political and constitutional issues and above all it will generate enormous confidence amongst the population and build us into a nation. Again it would provide us another competitive edge over our neighbours in becoming the better, safer and more reliable place to invest in. Needless to say the highest echelons in industry and government must set the example. People only hear what they see.

It is heartening to see that progress is being made in this direction. Time however is of the essence. It may smack of over simplicity but to achieve an efficient judiciary (independence can follow) the number of judges should be significantly increased along with the

rest of infrastructure to cope with the millions of pending cases. Should this mean a levy of a Judiciary Tax for a period of one or two years, the country would welcome it. A reliable institution that delivers is essential. Finally, to make such independence of judiciary permanent, into public opinion needs to be mobilised so that the voice of the nation provides this independence, not just the constitution or the laws.

4. Infrastructure

Infrastructure is vital to successful business operations. While considerable scope for development remains, Pakistan has made enormous improvements and has almost all state of the art facilities in tele and electronic communications. Only 17,000 applications of telephone connections remain pending in Karachi as on February 1996. Had it not been for the recent ban on mobile telephone (for security) we would have been ahead of India and other South Asian countries. Another considerable competitive edge.

Remarkable progress in Electricity and oil gas

production has been achieved. Local oil and refining capacities are fast improving. Electricity is now available in almost 40000 of our 45000 villages. We are now considering refusing further investment in power generation. Road network and access to the rural markets is easily available. The condition of the roads however is appalling-a combination of lack of resources and corruption in implementation.

Our competitive weakness lies in our road, air and rail network with CIS countries and other neighbours. The answer to the large market of India, that Pakistan could offer, is the market in the total region of over 300 million population. East Europe & Turkey are already making inroads into CIS.

5. Human Resources

To manage the achievement of our Vision, fight competition and take the country forward we need a stream of people, capable and competent of delivering. Whilst mass education is a must the crying need in the next five years is to put at least 10,000 of our under graduates and graduates through the best education in all fields may it be governance, technology, business management, sciences or whatever. This will mean setting up institutions of such quality which will then lay the seeds of availability of future talent which investors could depend upon. If these are expensive institutions let them be. We must shatter this myth of 'creating a class of its own! We urgently need excellence and we cannot provide it to 120 million in

the next 4 years. We must be aware that India today has a competitive edge in this respect and for progress, availability of the right Human Resources is vital.

At the end may I say that our country has great potential. I have heard it said by Pakistan, is foreigners including diplomats, psychologists, educationist, bureaucrats, politicians, businessmen--- and many other. I wonder why is it at Pakistan could not, so far, produce the equivalent of a Singaporean, Thai, Taiwanese, Malaysian, Vietnamese, Korean, Japanese, and even Bangladeshi Miracle-----!!! This sleeping giant however has certainly begun to stir!!!!



-
- Verily God does not change the destiny of a people.
Until they change themselves.
- O young man, do not use destiny as an excuse.
How can you load your own sin on something else?
- The wing of the falcon brings to the king,
the wing of the crow brings him to the cemetery.

LETTERS TO EDITOR

The truth will come out Akbar Rehman

Engineers of Pakistan have always been suggesting the advise given to the successive Governments of Pakistan by its foreign adviser *have led country to its present state* and in order to get itself out of economic *impasse* Pakistan should try to stand on its own legs and discard the crutches of foreign aids advisors.

Recently Lady Margaret Thatcher, the longest ruling Prime Minister of United Kingdom in the 20th century, made the following statement in his address at a lecture organised in Lahore by the Citibank Pakistan. She said Pakistan was blessed with a hard working and adaptable people as was shown by the large contributions of overseas Pakistanis, remittances to the national economy. "All these considerations are grounds for hope and indeed expectation - that a far more prosperous and successful future awaits this country".

Referring to Pakistan's economy, Lady Thatcher said that Pakistan's

economy, was suffering problems of under development like over dependence on agriculture, poor infrastructure, unreliable energy supply, an insufficiently educated work-force to meet the demands of economic change and, lastly, enormous political pressures on government to spend revenues which it lacks to overcome the crushing burden of poverty. These difficulties had been increased both by political instability and in the past by a misguided adherence to schemes of economic planning urged on local politicians by Western advisers.

Lady Thatcher said that as one of the world's largest Muslim nations, Pakistan had demonstrated clearly its faith in freedom, stability and peace. "I believe that muslim countries like Pakistan are right to develop their own way of doing things which should be taken into account while making major political and economic changes," she added.

"50 years is enough"

Engr. Farooq Ahmad

This is with reference to the article on IMF published in the last issue of Engineering News.

When World Bank & IMF - the two Britonwood Sisters were set in 1944, it was hoped that it would create a new international order by ensuring international economic cooperation leading to improved living standard and peace world wide. But the general consensus in 1994 is that the World Bank has failed in achieving this mission and instead have promoted a development model which has made rich richer and poor poorer. World Bank is also accused of pursuing policies that has led to ecological disaster and degraded world resources base. In the eyes of many, it has become an instrument of developed countries in establishing their hegemony political, economic, cultural over the world - a form of New Imperialism.

Bernad Shaw said about the nineteenth century imperialism that whenever an European power wanted to colonize a country, it would send a missionary to that country

to preach. The 'natives' would kill the priest and thus provide an excuse to the European to send the army to occupy the territory and start its "civilizing mission".

The "modus operaudis" has not changed. In fifties developing countries were encouraged to get Assistance, both technical and financial, for development. The advisers made grandiose plans - mostly in Jargon invented in Economic Schools of donor countries which required large capital outlay. World Bank obligingly come to help and give generous loans. With loans come more advisers now called consultant and slowly and imperceptly the economy of the country went under the control of World Bank. The countries dependence increased further and more loans were taken. The result was larger the assistance sought, the longer the dependence on World Bank and the severer the conditionalities for new loans.

According to one estimate, this pattern has been applied to 67 countries of the world. Once the grip on the

economy was firmed, political and cultural hegemony was imposed.

Pakistan is a classical example of this. In fifties came Colombo Plan (mainly assistance) (1952 - 1968). In sixties the World Bank moves in with its "Harvard School Planners" and Indus Basin Project. Our borrowing is mostly for new projects but some loans are given for maintenance. In seventies we started borrowing for maintenance as well. In the eighties we started borrowing for consumption. Today our dependence on World Bank is complete. We borrowed more than we can pay back. In 1988, we approached the world Bank in distress, and like a greedy doctor the World Bank came up with "conditionalities" before coming to our rescue. One of the conditionalities was to impose an interim Government not only of their choice but also of their own personnel.

In 1994 another distress signal was sent to World Bank and we landed with a new set of conditionalities - the economic hegemony was thus complete. Soon we will be asked to toe the line

of Western Powers and thus political and cultural hegemony will be achieved.

It goes to the credit of Engineers of Pakistan that they could foresee this and for over quarter of a century they have been warning the nation of the consequence of too much dependence on World Bank or what is euphamistically called AID. But unfortunately these warnings were not heeded to as Engineers had no place in decision making process at the National level. In fact, those who were in power tried to borrow as if "with a vengeance" not only to keep themselves in power, but also to get lucrative jobs for themselves or their sons keep themselves in power, but also to get lucrative jobs for themselves or their sons and sons-in-laws in Washington, Manila or London. But the day of reckoning had to come one day - and it has come not for them but teeming millions of Pakistan.

It is the duty of the Engineers and other professionals of Pakistan to pull the country out of the quagmire of debt and put it on the road to self-reliant

development. Unlike the past, they should not look to the ruling cliques and vested interests, but go directly to the people of Pakistan, inform and educate them. Thus they will not only be true to their profession, but find their rightful place in the society, denied to them for nearly half a century "50 years in Enough" should be our slogan as well.

Kalabagh Dam

Engr. Hamid Asghar

Please accept my sincerest felicitation for publishing Engr. Abdul Rasool Memon's interview in your last issue. He has very openly and frankly put forward his views on Kalabagh Dam and other relating matters.

The main objections on Kalabagh Dam according to Engr. A.R. Memon are:

1) There is no water available for storage in this Dam.

(2) The ecological problem caused by lack of water in Indus Delta will bring disaster to Sindh.

As regards No. 1, all studies shows that there is enough water available in

the Indus System not only to build Kalabagh Dam but even few more. It is not understood how Engr. Abdul Rasool Memon has said that there is no surplus water for Kalabagh Dam. Regarding the ecological problem of Indus Delta it has been contended by many that already foliage in the Delta are being nurtured by saline water from the Sindh. Therefore, they do no need fresh river water for survival. In this regard I would like to refer to the study done by the Consultants appointed by Sindh Irrigation Department which has up-held this view.

It is very gratifying to note that Engr. Abdul Rasool Memon has up-held Water Accord signed in 1982. To get the maximum benefit out of the Accord, high dams on Indus are a must otherwise a large quantity of water will be going down to sea, depriving large tracts of land of NWFP, Punjab, Balochistan and Sindh from the water and consequently lead fast rate and to feed it we need more land under cultivation. Already we have lost valuable time and if we keep on quarelling over all such vital matters

the day will not be very far when Pakistan will face severe famine like Somalia.

I, therefore, request Engr. Abdul Rasool Memon to put his weight on the side of the progress which will be in accordance with training; education and aptitude.

Code of Ethics

Engr. Saadat Mund.

Dr. Irshad Ahmad's letter regarding Code of Ethics has drawn attention to a very important question concerning the Engineering Profession, nay concerning the body-politic of our nation. Corruption is eating the very vitals of our national life. We have not only corrupt engineers but bureaucrats politicians, doctors, bankers & businessmen. But spotlight is focussed mainly on Engineers. No doubt, there are black sheep in the Engineering Profession, but their number is not more, may be less than in other walks of life.

Corruption in Engineering Profession is highlighted just to malign them. It is because Engineers have challenged those who are in power and

seek to get absolute power? Or because they want to change the existing structure. Such men have been declared dangerous, by no less a person than Shakespeare long before. East India Company set fool on the shores of Indian Sub-continent. So these dangerous men must be maligned and their image tarnished so that they do not pose threat to the establishment.

The PEC Code of Ethics was adopted in sixties. It was compiled by Engr. Saad Ali. It is a beautiful Code and needs no alteration. This code is unique in the sense that it is based on Quranic Ayats. No other Code of Ethic have this distinction. Engineers should be proud of it. What is needed is not change or alteration but a resolve on the part of every Engineer to implement this Code on his daily life.

OFWM PIPEDREAM



Dr. M. Yaqoob Bhatti

The recently splashed one page advertisement in the National press about the ushering in of a second green revolution in Pakistan by undertaking accelerated On Farm Water Management by the Federal Ministry of Food and Agriculture can at best be described as a pipedream based on its utterly fallacious and unattainable aims. It claims to renovate 30,000 water courses in a period of 3 years against a similar number renovated in the past 20 years which is claimed to save 18.6 MAF of water bringing 2 million additional acres under irrigation. It may be recalled that the total surface water available for irrigation is about 140 MAF in our river system out of which according to Mr. A.R. Memon an IRSA authority only 16 MAF is lost and 15 MAF is transferred to 3 on line reservoirs of Tarbela, Mangla and Chashma. The total canal irrigated area is 30.2 acres from a balance of 100 MAF leaving 10 MAF as minimum flow below Kotri for environmental balance.

The pertinent questions that are raised is as to how much additional area has been irrigated in the past 20

years due to OFWM. The existing statistics show that 4.9 million acres were irrigated due to Tarbela and Chashma waters and 4.6 million acres due to tubewells in the past two decades. If we are to suppose that renovating all the one lac water courses would save 55.8 MAF of water which is almost one half of total surface water available it would be a fantastic figure. The OFWM authorities are urged to re-examine their claims as it is bound to raise the heckles of agriculture and irrigation experts due to the unrealistic claims. It is feared that "green orchard" is being shown to people to use as a diversionary tactic from the Kalabagh Dam which is reported to have been shelved at present. The OFWM work and storage dam ought not to be exclusive of each other.



PEC IN THE NEWS

Kalabagh Dam has been making headlines. A seminar jointly organised by Lahore Chamber of Commerce and Industry, Press Institute of Pakistan and Engineering Review, presided over by Federal Minister of Water & Power, Mr. Ghulam Mustafa Khar, was held at LCCI Auditorum on 13th April, 1996. Among those who attended were four Engineers ex-Chairmen of WAPDA, Lt. General (R) Fazl-e-Razik Khan, Lt Gen. (R) G.S. Butt, Lt. Gen. (R) Zahid Ali Akbar, Mr. Shamsul Mulk and the present Chairman, Mr. Khalid Javed. Only exception was Mr. Shah Nawaz Khan who was conspicuous by his absence.

Those who spoke included in addition to above, Engr. Mazhar Ali, Mr. Tariq Saigal, President LCCI, Mr. Abdur Rahim Mahsud, ex-Secretary, Water & Power, Mr. Muhammad Sa'adat Ali of IRSA and Mr. S.Munawar Ali, Chairman A.C.E

After the inaugural address by the Minister of Water & Power, a penal discussion was held in which well known journalists and engineers and men of business participated.

The general consensus was that Kalabagh Dam has not been

built because of lack of political will, technically it is most investigated Dam.

A Committee was formed at the Seminar to sell Kalabagh to other provinces. Lt. Gen. Fazl-e-Razik Khan was elected Chairman of this Committee and Mazhar Ali, Sa'adat Ali and one representative each from Sindh and the Punjab were nominated on this Committee.

Minister of Water & Power announced in the Seminar that Engr. Shamsul Mulk was appointed Special Secretary (Grade-22) in the Ministry of Water & Power for co-ordinating efforts to build water storage Projects including Kalabagh Dam.

P.E.C. Brief's Chief Minister, Punjab on Kalabagh Dam.

A delegation of PEC was invited by the Chief Minister, Punjab, Sardar Arif Nakai, to brief him on Kalabagh Dam. The P.E.C. delegation was led by Ch. Mazhar Ali and consisted of Mr. Shamsul Mulk, former Chairman WAPDA, Engr. Dr. Izhar ul Haq, Secretary PEC, Engr. Capt. (R) Muhammad Qadir Khan, Joint Secretary PEC, Mr. Iftikhar Haq, Treasurer PEC and Sh. Nisarul Haque, Chief Editor, Engineering News and Mr. Anwar Arif. Chief Minister was assisted by Sardar Maqsood Ahmad

Khan Leghari, Minister for Irrigation & Power, Punjab; Chief Secretary, Chairman Planning and Development Board, Secretary Finance and Secretary Irrigation, Punjab.

Engr. Mazhar Ali and Eng. Shamsul Mulk gave details of Kalabagh Dam. They said that technically the project had been approved by many International & National Agencies and if there is any doubt in any body's mind it can be cleared. But unfortunately the issue has been politicized and it has to be tackled politically. If the project is not built, the country will face great shortage of food and fibre and energy. These shortages will also endanger the unity of the Federation of Pakistan.

The Chief Minister asked some very pertinent questions which were answered by the speakers. The fear that Nowshera will be drowned or Swabi District of NWFP will be submerged, are unfounded nor the fear that Punjab will have upper hand on supplies to Sindh.

Chief Ministers Punjab said that Punjab had offered to forego its royalty, if this is the reason for opposition to Kalabagh Dam.

Chief Minister asked PEC to give similar briefings to other Provincial Chief

Minister after which he will hold a meeting of representatives of all the provinces and develop consensus on this issue.

PEC holds Press Conference on Privatization of Irrigation Waters.

P.E.C. called a press conference on the crucial issue of Privatization of Irrigation Water. Dr. Mubashir Hasan presided over the conference which was attended by representatives from Institution of Engineers Pakistan, Federation of Engineering Associations, Farmers Association of Pakistan etc. In his opening remarks, Dr. Mubashir Hasan drew the attention of gentlemen of the Press - and through them the people of Pakistan about the danger of dismantling centres of old water distribution system of Indus Valley on the behest of foreign advisers. These changes will spell disaster for Pakistan, as such farmers will be deprived of their livelihood and compelled to move to urban areas. There will be unemployment and shortage of food. The ensuing social and political disturbance will lead to disintegration of the country. Dr. Mubashir Hasan stated that there was deficiency in the present set-up of Irrigation Department but these could be set right by corrective

measure. There is no need to take drastic measure as proposed by IBRD and foreign advisers.

Dr. Mubashir Hasan was supported by other speakers particularly from Farmers Association.

Letters a-glore!

Dr. M. Yaqoob Bhatti has started a one-man crusade for saving Pakistan from famine, starvation and economic disintegration which would ensue if River Indus waters are not properly and economically used. Dr. Bhatti feels that if Kalabagh Dam is not built soon it would lead to disastrous consequences for Pakistan. He has written over 50 letters in one year to various newspapers drawing attention to this impending disaster. A montage showing his letters is produced elsewhere.

Dr. Ikram ul Haq Dar death condoled.

PEC has deeply mourned the demise of Dr. Ikram ul Haq, Vice Chancellor of Engineering University, Lahore and one of its Vice-Presidents.

PEC President Ch. Mazhar Ali has described the death of Dr. Ikram ul Haq as an irrepable loss for the engineering community.

PEC Supports Engineers Demands.

In a resolution PEC Executive Council has

reiterated the demand of Engineers, that professionals, should manage the technical (professional) departments because, "It is the age of science and technology and we should come out of the era of generalists if we have to survive in this fast developing technological world", they said and added that only the professionals be appointed as Heads of Technical Departments and Ministries in the Centre and the Provinces so that important decisions relating to the technical matters are not delayed or deferred.



PAKISTAN ACADEMY OF SCIENCES AWARDS
GOLD MEDAL TO DR. IZHAR-UL-HAQ

Pakistan Academy of Sciences has awarded a gold medal to Engr. Dr. Izhar ul Haq for his contribution to science of engineering. The award was given at a Convocation of the Academy presided by Chairman Senate, Mr. Wasim Sajjad.

PROFILE

Engr. Shah Nawaz Khan

Engr. Shah Nawaz Khan is Doyen of the engineering profession. He is not only the senior most engineer, who is actively engaged in the profession but also playing a leading role in its development and progress.

Engr. Shah Nawaz Khan was born in 1914, at Nowshera in N.W.F.P. After doing his F.Sc from Islamia College Peshawar in 1938, he joined Punjab College of Engineering & Technology, Lahore and obtained B.Sc. Eng. (Civil) in 1942. After graduation, he joined PWD of N.W.F.P. as an Assistant Engineer. Promoted XEN in 1948, he worked on the preliminary and detailed investigation of Warsak Dam. He was promoted as S.E in 1955. He continued to work at Warsak and was responsible for construction of 3.5 miles long irrigation tunnel which was executed entirely by a Pakistani team.

In 1960, he was transferred to WAPDA and posted at Mangla Dam. On Promotion as Deputy Chief Engineer, he worked as Resident Engineer (first Pakistani engineer to hold charge of this post). He was responsible for

construction of 3.5 miles long Sukhian Dam which was a component of Mangla Dam.

On the completion of Mangla Dam, he was transferred to Tarbela Dam in 1966 as Chief Engineer and later as General Manager.

In 1972, Engr. Shah Nawaz Khan was appointed Chairman WAPDA. It was the first time that an Engineer got this assignment. His tenure is remembered for development of engineering consultancy for introducing the participative management in WAPDA. In 1974, he was appointed Secretary to the Government of Pakistan, Ministry of Communication, another 'first' as he was the first from Engineering profession to hold this post. He was also the 'first' Chairman of NESPAK.

Engr. Shah Nawaz Khan has been a very active member of professional bodies like Institution of Engineers Pakistan, Pakistan Engineering Council and Pakistan Engineering Congress.



He is still very active in these bodies. He has also represented Pakistan in International Conferences and moots like International Commission on Large Dams, (ICOLD) and World Federation of Engineering Organisations (W.F.E.O)

Engr. Shah Nawaz's life is a shining example of dedication to profession and nation. Hard work with, sincerity and professionalism are the pillars on which edifice of a successful life is built and which can be a beacon light to others to charter them through the stormy seasons of life.

For the benefit of engineering community in general and for young engineers in particular the Engineering News requested Engr. Shah Nawaz Khan to give his views and

impressions on some of the issues facing the profession and the engineers. The question - answer interview is reproduced below:

Q.1 You graduated in engineering in 1942 when not many Muslims students were studying this profession. How far the interest in this profession has developed in Pakistan. What are the prospects for the future engineers as several new Faculties in the engineering profession have emerged during the last 50 years?

Ans: There is no doubt that engineering education has undergone a great transformation in the period of time when I graduated as a Civil Engineer in 1942 and the present time. Even the name of the Institute has changed from Mclagan Engineering College to the University of Engineering and Technology, Lahore. The total number of students in our batch, admitted in the first year was twenty. The admission to the college was on the basis of open competition. Out of the twenty students in our batch only five were Muslims. Most of the teaching staff was non-Muslim including a couple

of Englishmen. Every student used to get personal attention of the teacher. A student who could not pass the first year examination was not allowed to get admission in the second year and had to give up his engineering education. As a consequence of this policy, one of the five Muslim students could not get admission in the second year and only four of us could continue. The only tool available to us for help in the mathematical calculations was a slide rule and I still have it with me.

Only two branches of engineering were offered when I got admission i.e. Electrical and Mechanical. Civil Engineering was offered for the first time when we were promoted to the third year. As Civil engineering was then the most sought-after branch of engineering at that time, every one of us wanted to be admitted to the Civil Engineering class. While we were in the midst of the second year examination a declaration was made by the College authorities that the first ten students in the order of merit will be admitted in the Civil Engineering class. Three of the four Muslims were thus

selected for Civil Engineering class and I was one of them. Strict discipline was maintained in all the college activities. I do not remember having missed a single lecture unless I was down in bed with high fever. I do not remember a single occasion when students went on strike for the fulfilment of even their genuine demands. The students respected their teachers and the teachers had full considerations for the students and thus there was complete harmony.

Interest in the engineering profession has been steadily developing since I graduated as an Engineer in 1942 and the profession has been attracting a large number of boys and girls specially after the creation of Pakistan. Interest in the engineering profession can be judged from the existence at that time of only a few engineering colleges throughout the undivided India and the number of engineering colleges and engineering universities in Pakistan today. Whereas twenty students were admitted in Mclagan Engineering College, Lahore in 1938, now more than

three hundred are admitted in the University of Engineering and Technology, Lahore. Admission on self-financing scheme is in addition to this number. A similar number is admitted in the remaining four Engineering Universities of Pakistan. In addition to the disciplines of Civil, Mechanical and Electrical engineering most of the colleges and universities are now offering Electronics, Chemical, Metallurgical, Agricultural, Mining, Industrial and Petroleum engineering.

The number of engineers produced by our engineering institutions is more than what we are absorbing at the present. There are, however, more avenues for the employment of engineers in Pakistan. These avenues are industry, construction, consultancy. Many industries are employing far less professional engineers than they require for quality production. Most of the constructors engaged in the construction field avoid engaging qualified engineers for the planning and supervision of their projects. Consultancy firms will be able to absorb more

professional engineers once they are allotted their due share of responsibilities by the Government of Pakistan which at present is relying more on foreign consultants.

It is high time that we make earnest efforts to improve the quality of engineers produced by the engineering universities. Only those students should be allowed admission in the engineering colleges who pass the prescribed admission test. Strict discipline must be maintained and an engineering atmosphere must prevail in the engineering institutions. The habit of hard work must be inculcated amongst the engineering students.

Q.2 How far interest in engineering has developed among the girl students and how far it is a useful profession for them? I mean can the girls prove successful engineers?

Ans. In the Executive Committee of Pakistan Engineering Council today we have three female engineers. One of them is an Electrical Engineer, the second is a Mechanical Engineer and the third is an

Electronics Engineer. As a member of Enrolment Committee of the Pakistan Engineering Council, I scrutinize the cases of graduate engineers who apply for registration as professional engineers with P.E.C. It is very heartening to observe that more and more girls are graduating in all the main disciplines of engineering. Recently we held interviews for selection of Registrar, Deputy Registrar and Assistant Registrars for the Pakistan Engineering Council. The basic qualification for these posts was B.Sc. Engineering. It was very encouraging to see that a few girls had also applied for the posts and they also turned up for interviews.

Engineering profession is not reserved for men only. Women have as much right to become engineers as men. Some girls are highly talented and they could become very competent engineers. They should be given encouragement to follow the profession of engineering which needs individuals of high calibre.

Q.3. You were the Chief of Mangla and Tarbela Dams during the peak

construction period when a large number of foreign consultants and contractors were working at these projects.

Tell us some of your experiences and how far the young Pakistani engineers benefitted by working side by side the foreign engineers?

Ans. Out of my total engineering career of thirty eight years I spent twenty four years at Warsak, Mangla and Tarbela where I remained actively engaged on the construction of these three Hydro Electric projects. All these three projects were planned, designed and constructed by foreign consultants and foreign contractors. There is no doubt that quite a few of the foreign engineers were highly qualified and experienced in their fields but some of them were below average and it appeared as if they had been brought here to improve their knowledge and experience. There is no doubt that this objective was achieved and these engineers of low standard became engineers of high standard after the

completion of these projects.

Whereas our skilled and semi-skilled personnel were greatly benefitted by working on these projects and their skills were advanced, our engineers were not able to increase their knowledge and skill to an extent expected of them. The main reason for this situation was the attitude of foreign engineers. According to the contractors their target was the completion of the project in the scheduled period of construction and in accordance with the specifications laid down by the project consultants and they were not obliged to train our engineers.

In the case of Warsak Hydro Electric Project and Mangla Hydel Project the complete designing was done in the home offices of the consultants. We were able to bring in some improvement in Tarbela Dam project. After I took over as Project Director I was able to persuade the project consultants to do the detailed design work at the project site. As per their demand we provided a large design office and seconded to M/s TAMS a good team

of Pakistani engineers of different levels to work on the detailed design of the project. Later on these very engineers became the backbone of the Pakistani firms of consulting engineers which I helped to set up after I took over as Chairman WAPDA.

On the construction side we fared much better. The three and a half miles long irrigation tunnel at Warsak which was included in the contract of the Canadian Contractors, I prevailed upon the contractors management to hand over the excavation of this tunnel to us although they had their reservations about this proposal. When I gave them the names of my team of two Executive Engineers and six junior engineers I was asked whether any of us had the experience of excavating long tunnels. My answer was that none of us had the requisite experience but whenever needed we would get the necessary guidance from their experts. They even warned me that I might end up with two tunnels if I planned to tackle the excavation of the tunnel from two ends. With that fear at the back of my mind all the time we took extra-

ordinary care in the survey of the tunnel for its alignment. By the Grace of Allah this work was completed by a hundred percent Pakistani crew in a highly satisfactory manner at practically half the cost provided for this job in the project estimate. I am happy to see that engineers who worked with me as junior engineers on Warsak project are holding very senior positions in WAPDA. Engr Saeed Akhtar Niazi, Ex-Member Power WAPDA and Engr. Khaliq Khan are amongst them.

Q.4 You were the first Engineer to become Chairman WAPDA where a large number of engineers are working. What are your experiences as Chairman WAPDA which is the largest professional organization?

Ans. I am of the opinion that WAPDA of our times which had taken in its fold a large number of talented engineers at different levels from all the Provincial engineering departments was the best engineering setup in the country. The successful completion of the Indus Basin projects, the launching of the extensive SCARP

programmes, and creation of a net work of power plants, high and low voltage transmission lines is an outstanding performance from any standard anywhere in the world.

WAPDA was created as a semi-autonomous organisation and so long as it enjoyed the status its performance remained superb. The Authority consisted of a Chairman and three Members. There was no interference in its day to day working from the Provincial Governments and very little interference from the Federal Government. With the Chairman and its three Members having their offices on the 7th floor of the WAPDA, House, meetings of the Authority could be summoned at a very short notice. After I took over as Chairman WAPDA I set up a Central Contract Cell under a competent engineer who had dealt with contract administration at Mangle and Tarbela. This officer was allowed to make up his team with engineers from both wings of WAPDA i.e. Water and Power. Both these wings of WAPDA started making use of this Cell and by doing so the

contract administration became uniform throughout WAPDA and the chances of maladministration were considerably reduced.

Another event of significance which took place in my tenure as Chairman WAPDA was the decision to create Area Electricity Boards. These Boards became active after I left WAPDA but their functioning is not the way I had envisaged. I wanted these Boards to be more or less independent entities. Each Area Board was to receive power from WAPDA at a certain point which would be measured every month. Payment of this power was to be made to WAPDA at an agreed tariff. It would then be the responsibility of the Board to distribute it and receive payment from the consumers. Each Area Board would prepare its own budget and send a copy of the same to WAPDA for information only.

WAPDA is a very large organisation and for its efficient and smooth operation it is of utmost importance that a senior and respectable engineer

from within WAPDA should be selected for the position of Chairman, WAPDA. When such an engineer is not available within WAPDA, a thorough search should be made for a senior engineer from outside WAPDA. After I left WAPDA for posting in the Federal Government an outsider was posted as Chairman, WAPDA. He had to be replaced in a period of a year or so. As time passed interference from the Federal Ministry of Water and Power in the day-to-day administration of WAPDA took place. At one stage even Superintending Engineers were transferred under the instructions of the Ministry. The recent amendment in WAPDA Act by which three Federal Secretaries were added to the Board of WAPDA has further reduced the efficiency of this organisation. A Federal Secretary is an extremely busy Government functionary. Besides, he is located at Islamabad. Amongst the newly added members of the Board is the Secretary incharge of Water and Power which is the controlling Ministry of WAPDA. It would be interesting to find how many meetings of the Board

took place since its expansion and a similar period of time before this expansion. The last blow to the prestige of WAPDA was delivered when its Member Power and its Chairman were thrown out of WAPDA unceremoniously.

Q.5 You were also the first Engineer to become Federal Secretary in the Government of Pakistan and you paved the way for other Engineers to become Secretaries of other professional Ministries. What are your experiences as Engineering Secretary and to what extent you had a say in the higher policy making hierarchy?

Ans. When I assumed charge as Federal Secretary Ministry of Communications I reported for duty to a Minister who was a hard task master and who took a lot of interest in the work of the Ministry. With my background of WAPDA I found the work at the Ministry rather easy although the nature of work was a bit different. T&T (Telephones and Telegraphs), a large organisation was a part of the Ministry. Telephone Industry, Haripur, was also under the Ministry of

Communication. Karachi Shipyard was also an engineering organisation. In addition we had National Highway Authority and National Shipping Corporation. There was a large number of engineers in these organisations and looking after the performance of these engineers and looking after their interests was highly satisfying. I had no difficulty whatsoever working along side with the non-professional heads of other ministries.

Q.6. It is very strange that now almost all the Technical Ministries and autonomous bodies like WAPDA and Railways are being headed by non-professionals. What are the reasons that the engineers are being deprived of these high positions despite protests and demands by the engineers and bodies like Pakistan Engineering Congress.

Ans. Association of Engineers and other professionals at the policy making level of the Federal Government was a great revolutionary step taken boldly by the Government of Mr. Bhutto. There are quite a few Ministers which

are technical and the affairs of these Ministries can be looked after by professional Secretaries in a much better manner than by non-professional Secretaries. At one time or other the following Ministries /Divisions at the Federal level were headed by professional Secretaries:

1. Ministry of Communication
2. Ministry of Water and Power.
3. Ministry of Science and Technology
4. Ministry of Defence Production
5. Ministry of Production
6. Ministry of Railways
7. Ministry of Education

As time passed the professional Secretaries were replaced by non-professionals one by one and today we have reached a situation where we have only one engineer heading a technical Ministry. These replacements of professionals by non-professionals was not because the professional could not deliver the goods. Summaries for such postings are initiated in the Establishment Division and this Division has mostly been headed by a non-professional. That a non-

professional Secretary can run a technical Ministry better than a professional Secretary is a logic difficult to understand.

Q.7. With the passage of time, several branches in the engineering profession have made rapid progress in the developed and developing countries. What measures should the Government take in providing advanced training to the Pakistani engineers in the latest technologies?

Ans. The first step in this direction is to produce better engineers. The second quick step should be in the direction of achieving self-reliance at all costs. The third step is to become serious about Research and Development.

As a fourth step the status of Engineers and Scientists must be raised and one way of distinguishing from other will be to enhance their age of superannuation.

The fifth step would be to ensure that every appointment, promotion and posting is entirely on the basis of merit and suitability of a person and on no other consideration.

An Engineer or Scientist is the most important player in the game of progress and development. Unfortunately he is a weak link in the chain. Sometime back I was a member of the selection Board of an Engineering University for selection of teachers and I must say I was thoroughly disappointed with the calibre of the young graduate engineers who appeared before us.

Another occasion I was in a meeting of the Enrollment Committee of Pakistan Engineering Council when one day we decided to test the engineering knowledge of the graduate engineers who had applied for registration as professional engineers. The standard of these young engineers was far from satisfactory. We should no longer keep our eyes shut to this very important issue and it should be tackled at a very high level. I strongly suggest that a meeting of all the Vice Chancellors of the Engineering Universities should be held under the chairmanship of the Prime Minister of Pakistan.

The criteria of marks obtained in the pre-engineering classes must be discontinued forthwith. No time and effort should be wasted on a student who does not pass an aptitude or admission test.

Self-reliance: It has been observed that as time passes our goal of achieving self-reliance is becoming farther rather than drawing nearer. The number of foreign consulting engineers and foreign contractors working in Pakistan is on the increase. By employing foreign engineers and experts we are depriving the local engineers of the opportunities of using their initiatives. I feel that this is the root cause of our backwardness. It is a matter of great regret that after fifty years of our life as a free nation and after having executed some of the major projects of the world we should be employing foreign consultants and foreign contractors for the construction of roads and bridges. There must be some very strong reasons for doing so and the Nation has a right to know these reasons.

The surest path for self-reliance is self help. Let us look at the example of China. The Chinese did not rely on foreigners for the attainment of self-sufficiency in practically all fields. In 1974 I visited China for negotiating an agreement for the procurement of material and equipment for the 220 KV line from Tarbela to Burhan. During the visit I was taken to a thermal power plant near Shanghai. The Chief Engineer incharge of the power plant told me that he had been working at that plant for more than twenty years. He narrated to me the history of construction of the power plant. The design and construction of the plant had been entrusted to Russians. When the relations between the two countries deteriorated, the Russian Experts left the job in the middle and took away all the drawings and designs with them. They had the following alternative open to them:

(1) Employ engineers and experts from western countries and get the job completed in the scheduled time.

(2) Keep the construction programme pending and ask their own engineers and experts to study the problem and find a situation irrespective of any limitation of time. They decided on the second alternative and were able to complete the power plant. They were proud of their achievement and they repeat this story to every visitor who visits the project.

Compare this to the manner in which we are killing the initiative of our engineers and experts. The Government of Pakistan consider it a great achievement to have been able to enter into an understanding with a number of foreign investors for setting up thermal power plants in Pakistan. No transfer of technology whatsoever will take place. The foreign investors will operate these plants and will sell power to WAPDA. While drawing agreements with these investors it should have been ensured that the maximum components of these plants would be manufactured in Pakistan where such facilities exist at Karachi Shipyard, Heavy Mechanical Complex at Taxila and other large workshops at

different locations. The offer of only those firms should be accepted who offer to get the maximum components manufactured in Pakistan.

I do not understand why we are in such a big rush to get all the thermal power going on at the same time and getting them completed as soon as possible. Why don't we adopt ways and means of executing these projects through maximum Pakistani participation.

Research and Development: The attitude of the Government towards Research and Development is that of complete apathy. The Pakistan Council for Scientific and Industrial Research (PCSIR) is a premier research organisation in the country with its laboratories in all Provinces of Pakistan. It must have cost the Government of Pakistan huge sums of money on setting up these units and maintaining them. However, the amount of money set aside for this organisation is so meagre that after meeting the demand of salaries of the staff and maintenance of building and equipment, very little is left

for carrying out any research activities. I have been a member of the Council for one term and my observation was that a very large number of scientist, and engineers employed at the Research laboratories is not put to proper use for want of adequate funds. This state of affairs is the result of the dominant role played by non-professionals at the policy level of the Government and their indifference to Research and Development. It is of utmost importance that the Council should prepare a realistic budget for its activities every year and this demand should be met in full without any arbitrary cuts. All other research organisations in the country should be treated in the same manner. A special Division for Research and Development should be created under the charge of a Minister of State which should look after all the research activities in the country. A committee of the Senate or National Assembly should be set up which should scrutinize the reports of the various Research Organisations of the country and keep a vigilant eye on them. In priority, Research and

Development should come after Defence, Health and Education only and above all other sectors.

Merit: So long as we do not recognise merit and suitability as the only criteria for appointment, promotion and posting in Government services we cannot aspire to be a progressive nation. The greatest obstruction to this criteria is caused by our politicians and members of Parliament who favour appointments on political consideration only. We have observed that the present as well as all previous political Governments in Pakistan were mainly concerned with safeguarding their position and as such they are unable to withstand the pressure from politicians and members of Parliament. Members of Parliament both at the Federal as well as Provincial level should have nothing to do with the appointments, promotions and transfer of any Government functionary at any level. They should keep a watch on the performance of Government servants in their respective constituencies and recommend action against those Government servants

who indulge in malpractices.

Q.8. There has been frustration among the engineers that no Service Structure for them has been formed and recommendations by Engineering Commissions have not yet been implemented. What are your views about it?

Ans. In the absence of a service structure the promotions of engineers from one grade to next higher grade takes much longer than their counterparts in the Civil Service of Pakistan. This situation is bound to create frustration amongst the engineers serving in the Government departments. In addition, there are quite a few genuine demands of engineers in Government service. The Federation of Engineers and a number of Associations of Engineers have been protesting against this step-motherly treatment of engineers. A couple of months back the Federation of Engineers gave a call for countrywide strike by engineers and before the actual date of the strike a Federal Minister invited a delegation of the Federation for talks and the

strike notice was withdrawn. It is reported that the Minister gave an assurance to the delegation that the demands which were quite genuine will be placed before the Government and he was quite hopeful of the acceptance of these demands. Unfortunately nothing further has been heard in this connection. I am in full agreement with the demands of the engineers and would request the Government for its acceptance at an early date.

Q.9. You are also the Founder Chairman of Pakistan Engineering Council which was formed under an Act after great struggle and demands of the Engineers. The engineers do not feel satisfied by the performance of the organisation as it has done very little for the welfare of engineers and the promotion of the profession. Would you like to comment on this?

Ans. We must understand that Pakistan Engineering Council (PEC) is not a welfare association of engineers but a body set up under an Act of Parliament

for regulating the engineering profession and while doing so the welfare of engineers is automatically taken care of. The prestige of engineers and engineering profession has greatly enhanced with the creation of PEC. Under the provision of this Act, professional engineering work can be entrusted to professional engineers only and professional engineering work can be defined only by the Council. Before the enactment of PEC Act, qualified engineers were being treated by the bureaucracy at par with Diploma holders. PEC provides a legal cover to the engineers and the engineering profession. The very fact that more than fifty thousand qualified engineers are registered with PEC and their number is increasing every year is a clear indication of the important role played by the Council in regulating the engineering profession in Pakistan.

Q.10. Very little attention is being paid on research and development in engineering science and engineering industry. What are your recommendations?

Ans. I have given my comments on the issue while answering Question No.1.

Q.11. Finally, a question about Kalabagh which has become a politically controversial dam. It was declared technically sound and economically feasible when you were Chairman WAPDA in mid seventies. You are on record having said several times that Tarbela Dam is a forerunner and key to several storage dams on the Indus upstream and downstream of Tarbela Dam and you have been the supporter of Kalabagh Dam. What are your view and recommendations as an Engineer?

Ans. There is no doubt that Kalabagh Dam project is technically sound and economically viable. However, three Provinces of Pakistan i.e. Sindh, NWFP and Balochistan are opposed to its construction. The opposition of NWFP is not merely for the sake of opposition. They have genuine fears as recorded by the project consultants of Kalabagh Dam in their project planning report. A large area of NWFP including the city of Nowshera and Cantonment of Nowshera will be drowned when a flood of 1929 magnitude occurs

after mid term sedimentation of Kalabagh reservoir. The project consultants had proposed the construction of 28 miles long dykes to protect these areas.

The detailed investigation of Basha Dam on Indus River upstream of Tarbela are already in hand. The construction of this Dam will reduce the intensity of flooding in Indus river. There is also a proposal for the construction of a dam on Swat River upstream of Abazai Head Works. This dam will reduce the intensity of flooding in Swat River which is a tributary of Kabul River. With these two Dams the danger of flooding of areas in NWFP as a result of Kalabagh Dam will be considerably reduced. If this position had been explained to NWFP instead of demarcating the limit of a hundred year flood, the position would have been quite different. The damage was done by WAPDA officials when they demarcated the limits of the hundred years flood and started identifying the houses and property which would be submerged. The people likely to be affected approached their political leaders and that is how the issue became political. The political leaders of NWFP will have to be approached

and the changed situation in view of the proposed Dams at Basha and Abazai explained to them. I hope they will listen to these new developments and give up their opposition to the construction of Kalabagh Dam.

The problem of opposition by Sindh can be discussed across the table with facts and figures. If it is proved to them that sufficient water is available in Indus River for storage after distribution of water amongst the four Provinces in accordance with the agreed formula that Province should have no objection to the construction of Kalabagh Dam.

Q.12. Engineering education is gradually deteriorating. Teachers do not take much interest in teaching and students are wasting their valuable time in strikes and play in the hands of outsiders. What is your message for them and for other young in-service engineers?

Ans. My sincere advice to an engineering student of today would be as follows:

1. Be a good Muslim.
2. Be a self respecting and proud Pakistani.
3. Look at yourself as a privileged person who is

being trained and groomed for playing important role in the development of your country. This is a difficult assignment and you have to face it with courage, hardwork and dedication.

4. Look at your teacher as a person who has devoted his life for passing on all his knowledge to you so that you are well equipped for facing the realities of life.

5. Respect your teacher and you will find that he is full of considerations for you.

6. Listen to good advice and accept it.

7. Do not listen to wrong advice.

8. Do not miss any lecture because it is not going to be repeated.

9. When your teacher realises that you are taking interest in your class work, you will see that he will come better prepared for his next lecture.

10. When you enter your practical life after receiving full benefit of studies in your institute you will find yourself full of confidence

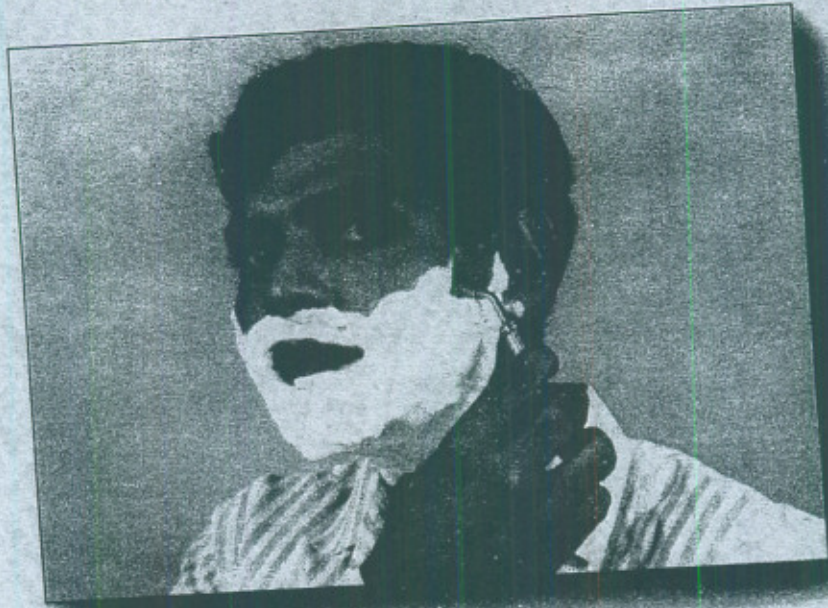
and those who come in contact with you, will respect you for your knowledge and behaviour.

11. Please understand that every decision made by your teacher or the University Authorities is taken with only one object in view i.e. to ensure the production of engineers of high standard by your University. They have no axe of their own to grind. You should therefore accept each and every decision with an open mind.

12. Please try to analyse the result of any previous strike in your college. Did a strike in any way cause any damage to the interest of the University authorities? It may have caused some inconvenience to them. They received their salaries and went through a period of rest from preparing their lectures. The only party that did suffer from it were the students. Please do not resort to strikes and do not break the continuity of the programme of studies. Strikes are not at all in the interest of the students.

My advice to the young in-service engineers is as follows:

When I visit the three large Hydro Electric projects at Warsak, Mangla and Tarbela, where I spent a major portion of my engineering career I am filled with a feeling of joy and satisfaction. Here are some great undertakings which are playing a vital role in the development and progress of our mother land. Volunteer yourself for difficult assignments so that when the time comes for tackling projects of national importance you should have the confidence to do so. Engineering is a difficult profession but if you have the requisite knowledge and stamina you would find it very interesting and absorbing. Do not restrict yourself to engineering activities only. You must take part in the social and welfare activities of the community in which you are living. You must have an upto date knowledge of what is happening not only in your country but also in other part of the world. You should also play an active role in the protection of environments as environments are going to play an important role in all future engineering projects.



The Complete Shaving Cream

- ▶ Luxurious creamy lather
- ▶ Smooth & comfortable shave
- ▶ An instantly refreshing feeling -with the gentle protection of Dettol for your skin.

Suitable for all skin types.

Dettol

Antiseptic Shaving Cream



Adds safety to shaving comfort



Reckitt & Colman of Pakistan Ltd

MPL



Zakat of the sea
 Scientifically known that the quantity in the world is 2.5 per cent of the globe. A similar amount annually to fall on the sea. Zakat is levied on the wealth of the sea.

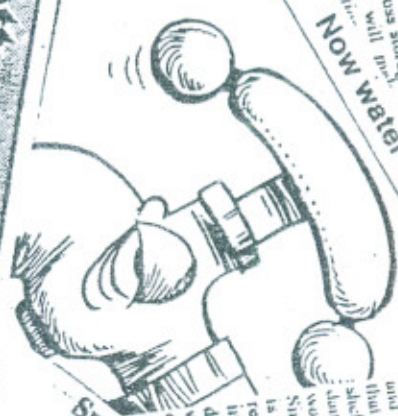
Recipe for disaster
 The National English Language Commission has reported that the Punjab government has been negligent in the absence of a proper water storage system. The Punjab government is also advised to take steps to improve the irrigation system.

Mr. Paliyo's views
 Mr. Paliyo, Chairman of the Punjab Water and Power Commission, has expressed his views on the Kalabagh dam project. He stated that the dam is essential for the development of Punjab and that the government should take prompt action to complete the project.

Water accord shelved
 The National English Language Commission has reported that the Punjab government has shelved the water accord with India. This decision is seen as a major setback for the water sharing project between the two countries.

Facts of Kalabagh Dam
 The Punjab government has recently released a report on the Kalabagh dam project. The report contains the following facts: The dam will have a gross storage capacity of 100 million acre-feet. It will generate 1,000 MW of power. The project is estimated to cost Rs. 1,000 crore.

Editorial: Disinformation on Kalabagh
 The Punjab government has been spreading disinformation about the Kalabagh dam project. It is important for the people of Punjab to know the facts and to support the project. The government should stop spreading rumors and should focus on completing the dam.



Support Khar on Indus Dam
 From Dr. M. Yaqoob Elahi

Mr. Ghulam Mustafa Khar, Federal Minister for Water and Power has recently reported in a press conference that efforts are afoot to obtain an earlier stipulation of the dam on Water and Power Commission. It is heartening to hear that the government is taking steps to complete the project.

Referendum on Kalabagh Dam
 We have reached a consensus on the Kalabagh dam project. It is time to hold a referendum to let the people of Punjab decide on the project. The government should take prompt action to implement the referendum.

Model of consensus
 It was latest in the Asian news bulletin of CNN on 7-4-66 that four countries, East Asia, Cambodia and Laos, have signed the Mekong River Development Agreement. This is a model of consensus that we should emulate in the case of the Kalabagh dam project.

Water storage
 Pakistan's main rivers, namely Indus, Ravi, Sutlej and Chenab are being dammed. This is a step towards water storage and conservation. We should take similar steps in Punjab to ensure the availability of water for all.

LETTERS

Letters to the Editor: Indus Dam an agricultural imperative
 The Punjab government should take prompt action to complete the Indus dam project. It is an agricultural imperative for Punjab. The dam will provide water for irrigation and generate power. It is essential for the development of Punjab.

Be large hearted like the Punjabis
 From Dr. M. Yaqoob Elahi

It is often said in the national press that the Punjabis are large hearted. This is a commendable trait. We should emulate this trait in the case of the Kalabagh dam project. We should be large hearted and support the project. We should not let our political differences stand in the way of the development of Punjab.

Priority dam as daylight otherwise Federal Gov. will spend Rs one billion on it
 The Punjab government should take prompt action to complete the Kalabagh dam project. It is a priority dam for Punjab. The government should spend Rs one billion on it. It is essential for the development of Punjab.

Kalabagh dam Presidential concern for Kalabagh dam
 The National English Language Commission has reported that the Punjab government has expressed its concern for the Kalabagh dam project. This is a positive step towards the completion of the project. The government should take prompt action to complete the dam.

Hydel power panacea
 Hydel power is the panacea for Punjab. It will provide water for irrigation and generate power. It is essential for the development of Punjab. The government should take prompt action to complete the Kalabagh dam project.

Model of consensus
 It was latest in the Asian news bulletin of CNN on 7-4-66 that four countries, East Asia, Cambodia and Laos, have signed the Mekong River Development Agreement. This is a model of consensus that we should emulate in the case of the Kalabagh dam project.

Water storage
 Pakistan's main rivers, namely Indus, Ravi, Sutlej and Chenab are being dammed. This is a step towards water storage and conservation. We should take similar steps in Punjab to ensure the availability of water for all.

Water storage
 Pakistan's main rivers, namely Indus, Ravi, Sutlej and Chenab are being dammed. This is a step towards water storage and conservation. We should take similar steps in Punjab to ensure the availability of water for all.

Kalabagh Dam
 From Dr. M. Yaqoob Elahi

Priority dam as daylight otherwise Federal Gov. will spend Rs one billion on it
 The Punjab government should take prompt action to complete the Kalabagh dam project. It is a priority dam for Punjab. The government should spend Rs one billion on it. It is essential for the development of Punjab.

Kalabagh dam Presidential concern for Kalabagh dam
 The National English Language Commission has reported that the Punjab government has expressed its concern for the Kalabagh dam project. This is a positive step towards the completion of the project. The government should take prompt action to complete the dam.

Hydel power panacea
 Hydel power is the panacea for Punjab. It will provide water for irrigation and generate power. It is essential for the development of Punjab. The government should take prompt action to complete the Kalabagh dam project.

Model of consensus
 It was latest in the Asian news bulletin of CNN on 7-4-66 that four countries, East Asia, Cambodia and Laos, have signed the Mekong River Development Agreement. This is a model of consensus that we should emulate in the case of the Kalabagh dam project.

Water storage
 Pakistan's main rivers, namely Indus, Ravi, Sutlej and Chenab are being dammed. This is a step towards water storage and conservation. We should take similar steps in Punjab to ensure the availability of water for all.

Kalabagh Dam
 From Dr. M. Yaqoob Elahi

Priority dam as daylight otherwise Federal Gov. will spend Rs one billion on it
 The Punjab government should take prompt action to complete the Kalabagh dam project. It is a priority dam for Punjab. The government should spend Rs one billion on it. It is essential for the development of Punjab.

Kalabagh dam Presidential concern for Kalabagh dam
 The National English Language Commission has reported that the Punjab government has expressed its concern for the Kalabagh dam project. This is a positive step towards the completion of the project. The government should take prompt action to complete the dam.

Hydel power panacea
 Hydel power is the panacea for Punjab. It will provide water for irrigation and generate power. It is essential for the development of Punjab. The government should take prompt action to complete the Kalabagh dam project.

Model of consensus
 It was latest in the Asian news bulletin of CNN on 7-4-66 that four countries, East Asia, Cambodia and Laos, have signed the Mekong River Development Agreement. This is a model of consensus that we should emulate in the case of the Kalabagh dam project.

Water storage
 Pakistan's main rivers, namely Indus, Ravi, Sutlej and Chenab are being dammed. This is a step towards water storage and conservation. We should take similar steps in Punjab to ensure the availability of water for all.

Water storage
 Pakistan's main rivers, namely Indus, Ravi, Sutlej and Chenab are being dammed. This is a step towards water storage and conservation. We should take similar steps in Punjab to ensure the availability of water for all.

ICC (Pvt) Limited

242-A, ANAND ROAD, UPPER MALL, P.O. BOX 1280, LAHORE-54000, PAKISTAN • TELEX: 44807 IMPER PK
FAX: 9242 - 5712594, 5753664 • PHONES: (042) 5757123-28 • CABLES: *IMPLINE* LAHORE



Head Office: 242-A Anand Road, Upper Mall Lahore - 54000
Tel : 5757123-28, Tlx: 44807 IMPER PK.
Fax : 5712594, 5753664

Mapping Office: 9-Shahdin Building, Shahrah Quaid-e-Azam, Lahore.
Tel: 6304601-2 Fax: 6368395

Karachi Office: Room No. 202, 2nd Floor, Faiyaz Centre, Sindhi Muslim Housing
Society, Shahrah-e-Faisal, P.O. Box 12619, Karachi.
Tel: 4559719-20 Fax: 4557756

500KV Office & Hub Project Office 13-C, Upper Storey, Fatima Jinnah Road,
Mohammad Ali Society (Near Jemni Ice Cream) Karachi.
Tel: 4545098-99 Fax: 439549

*Torch Bearers of Self Reliance in the Field of Engineering Consultancy
for National Development*



1958 38 YEARS 1996

OF
ENGINEERING CONSULTANCY

SECTORIAL COVERAGE

- Water & Land Resources Engineering
- Transportation Engineering
- Architecture and Town Planning
- Energy Engineering
- Environmental Engineering
- Industrial Engineering
- Geo-Resources Engineering
- Advanced Information Management

ACE GROUP COMPANIES:

ACE WATER ENGINEERING SERVICES (PVT) LTD.

1-C/2, M.M. Alam Road, Gulberg III Lahore 54460
Tel: 5759417-9 Fax: (92-42) 5710970

ACE TRANSPORTATION ENGINEERING SERVICES (PVT) LTD.

ACE House, 62 L-Block, Gulberg III, Lahore
Tel: 5830143-851055-5865258 Fax: (92-42) 5865554

ACE ENERGY ENGINEERING SERVICES (PVT) LTD.

10 Banglore Town, Sharea Faisal, Karachi - 75350
Tel: 4539895-4530825 Fax: (92-21) 4546679

ACE ARCHITECTURAL & TOWN PLANNING SERVICES (PVT) LTD.

22 - A, Faisal Town, Lahore - 54700
Tel: 5865379, 5332134 Fax: (92-42) 5832134

ACE ADVANCED INFORMATION MANAGEMENT SERVICES (PVT) LTD.

33-D, Mohd Ali Society, Off Miran Mohd Shah Road, Karachi 75350
Tel: 4539762-3 Fax: (92-21) 4538869

ASSOCIATED CONSULTING ENGINEERS - ACE (PVT) LTD.

(Pioneers Of Professional Engineering Practice In Pakistan)

associated with the prestigious project from the outset

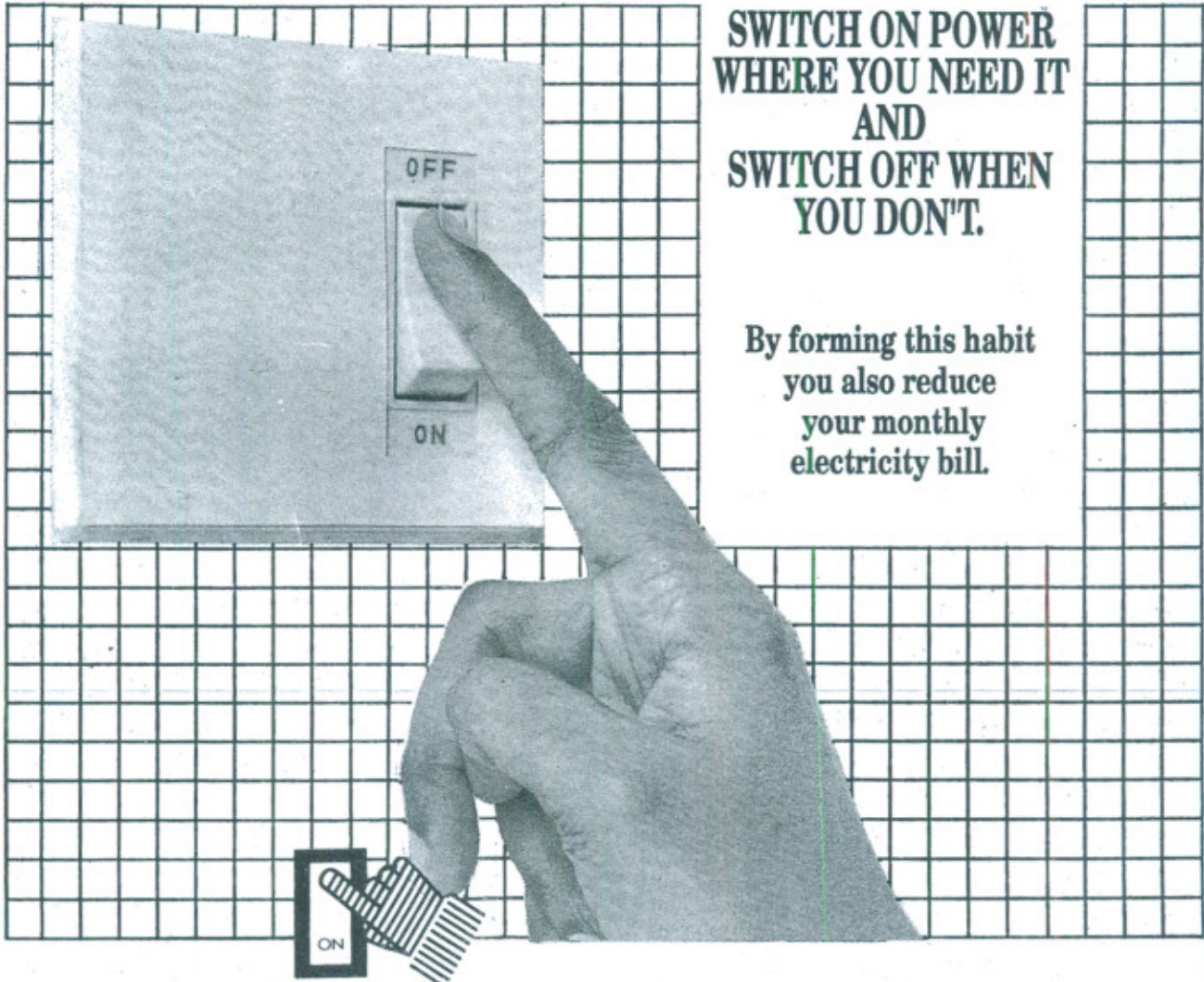
CORPORATE OFFICE: Jason Trade Centre, Sharea Faisal, Karachi - 75400
Tel: 4539208, 4534128, 4539219, 4530825 Fax: (92-21) 4546679

REGIONAL OFFICES: NORTH SOUTH
1-C/2, M.M. Alarm Road, Gulberg III 10, Banglore Town, Sharea Faisal,
Lahore 54460, Tel: 5759417-9 Karachi 75350 Tel: 432117
Fax: (92-42) 5710970 Fax: (92-21) 4535150

LIAISON OFFICES: Islamabad, Peshawar

OVERSEAS OFFICES: • SAUDI ARABIA • IRAN • MALAYSIA • INDONESIA • NIGERIA

A GOOD HABIT



**SWITCH ON POWER
WHERE YOU NEED IT
AND
SWITCH OFF WHEN
YOU DON'T.**

**By forming this habit
you also reduce
your monthly
electricity bill.**

**A little care
Makes the saving easy**

**SAVE ELECTRICITY
FOR YOURSELF, FOR THE NATION**



WAPDA
Public Relations