Ecology, Urban Life and Industry--Partners or Opponents? The Pilbara for Example

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Introduction

First, foremost and especially important, this is an incomplete and unfinished story. The area of Western Australia known as "the Pilbara" has existed for thousands of years, long before the Aborigines gave it its name. It is an area rich in minerals but precious little else unless one values sunbaked space.

The natural resources clearly represent exciting opportunities for exploitation, the big question is How? Some industrial activity has already begun and some port installations are in operation but compared with anticipated full potential the scale is miniscule.

On the whole the area is not one that man would choose to live and work in, although there are some attractive recreation possibilities on the coast. Like many such potential developments there will be a "critical mass" which means that everything is likely to be an expensive struggle until the critical mass is exceeded. Infrastructure, urban development, industrial development and protection of the environment must all be planned in phase with each other if an acceptable and economically worthwhile venture is to be achieved.

So what are the feasible development possibilities, what are the priorities, who puts up the capital and who does what?

The Pilbara

The Pilbara is on the coast of Western Australia (see figure 1), and is very approximately a 300 mile (500 km) semi-circle centred on two ports, Port Headland which has a population of about 10,000 people and Dampier with 6,000. The area includes the Hammersley Range, Mount Newman and Mount Goldsworthy where large finds of rich iron ore were discovered 10 to 15 years ago. Nickel, manganese, salt and also uranium "yellow cake" are all found in useful quantities.

The real Key to the intense current interest in developing the area however is natural gas. Huge quantities of gas have been located on the North West shelf approximately 80 miles off-shore and under 420 feet of water. The implied promise is for low cost fuel and feedstock for ethylene dichloride (plastics) production.

The climate is one adverse factor, heat and humidity are normally at levels that make air conditioning essential for both homes and work places. Water supplies as such, however, are not abundant. There are rivers in the area which could be dammed and some underground lakes are known, the rainfall however avarages only some 12 inches (30 cms) per annum and is exceedingly variable from one year to the next. It has been known for 3 years-worth to arrive on one day! Water is likely to be a limiting factor unless recycling and the use of less than pure water, including sea water, for cooling etc. can be utilized.

The Interested Parties

First on the list is the Government of Western Australia and in particular the Department of Industrial Development. A sizeable development at Pilbara would find favour because:-

1) at present the vast majority of the population of Western Australia lives within a few hundred miles of Perth - mostly along the coast. Darwin is the only other area with a sizeable population. Consequently the creation of a considerable urban development at the Pilbara would "spread" the population.

2) the natural resources, gas and minerals, will eventually be exported to other Australian states and other countries in their final form. The Western Australian Government is keen to ensure it is not simply selling its finite natural resources in a cheap form and is insisting that as much "value" is added before leaving the State. With regard to the natural gas, like the oil producing countries, it doesn't want its resource to be burnt, simply for heat.

Industry in general, the main basic metals and chemical companies in particular, comprise the other large interested party. BHP (the Broken Hill Proprietary Co. Ltd), Australia's own steel company is perhaps a special case in that it is partially accountable to the Commonwealth Government. Basically all such companies need the raw materials which are available at the Pilbara but since the markets are elsewhere, transportation of raw materials or semi-finished products or finished products is inevitable. Which is most economic?

To take a childishly simple illustration, it may take 200 tons of a mined mineral to make 100 tons of finished product. It may be possible to refine or preprocess the mineral so that only 120 tons are needed to make the 100 finished tons.

0 = on mining site; X = at market			
Mining (200 tons)	0	0	0
Enrich (120 tons)	0	0	X
Process (100 tons)	0	X	X
Transport Cost	100 units	120 units	200 units

In the simple case it clearly pays to do all processing at the mine and transport the final product. In reality however it will be more expensive to process in the mining area and so some, if not all the transport saving will be cancelled out and it can be that the finished product needs to be more carefully transported than a bulk raw material and that can further erode the savings.

Possible Industries

1. Natural Gas - would mainly be used for process heating directly, for power generation and as feed stock for plastics production (ethylene dichloride). There appears to be more than adequate known reserves which can be economically brought ashore and a strong indication that more gas still is in the general vicinity.

2. Aluminium - alumina is the primary raw material and is available in the South West Region of Western Australia. It would be quite practical to transport it to the Pilbara where the necessary low cost power would be available. Caustic soda is necessary for the production of aluminium, plans include its manufacture at the Pilbara.

3. Steel - the idea is to build a 10 million ton per annum steelplant using local high grade ore, power derived from natural gas and 2,000 acres of otherwise unproductive land. With today's technology a 10 million ton plant would use processes capable of producing steel at a very low cost per ton. Limestone would have to be imported into the area - about 3 million tons per annum but more of a drawback would be 6 million tons per annum of coal. Most of Australia's coal is on the east coast and most of its iron ore on the west - something has to move to bring them together for steelmaking! This means that the steel plant must be equipped with good port facilities.
Ferrous manganese, nickel, vanadium are all available locally and so special alloy steels could be included in the steel-making complex.

4. Caustic Soda - is required for aluminium production amongst other things and at present virtually all Australia's requirements are met by imports. High quality Sodium Chloride (salt) is at present produced at the Pilbara and the quantity could be increased and used for caustic soda production. A further

plant to produce caustic soda from salt brine by electrolysis is part of the plan.

5. Ethylene Dichloride - together with caustic soda, ethane liquefied from natural gas are the main ingredients for making Ethylene Dichloride. Production has to be on a reasonable large scale (850,000 tons per annum) to be economic, at this level the costs are competetive and by no means all the available ethane would be consumed.

6. Uranium Enrichment - although world uranium enrichment capacity is at present more than adequate a short-fall is anticipated in the none too distant future. Huge quantities of electricity are required and the promise of low-cost power is a major attraction. The raw material uranium "yellow cake" is available in Western Australia.

7. Subsidiary and Service Industries - if any non local steel making is to be fed with iron ore there is some advantage in pelletizing the ore on site. This enriches the iron content and reduces the bulk.
Service industries would include:

- machine shops
- foundries
- refractory brick production
- carbon anode production
- process controls and instrumentation
- ship repair and servicing

People

The full concept requires a work force which together with families and service staff plus their families adds up to a town for 130,000 people. A New Town Corporation has been proposed to design, implement and manage the required development. Since the signal to go ahead has not yet been given, only the New Town corporations objectives are known or opposed

to definitive plans. These are briefly to provide:-

1. each worker with his own air-conditioned home in order to encourage a stable work force.
2. "Good" education and recreational facility
3. Expanding total employment
4. Alternative employment opportunities

The implementation costs will be high since much of the infrastructure must go in first. It is hoped, however, that the town will be financially viable in its own right once established. Building costs are expected to be 1.5 to 2 times as high as compared with an already developed, hospitable area. Wages must be higher both to reflect the higher living costs and the need to attract a work force, at least in the early days.

Ecology

All the expected noises emanate from the Department of Environmental Protection and the staff there are well aware of many potential hazards. They are ready with some permissble limits for water and air pollutants but there seems little they can get their teeth into at present.

An all embracing policy which demands adequate protection of "flora, fauna and aboriginal artefacts" has been issued but again there is little to take issue with in the current situation.

Current Situation

1. The Government of Western Australia is keen to proceed but has not sufficient capital to start building the infrastructure etc., the Commonwealth Government must be an agreeable partner both for political and financial reasons. A decision was expected by the end of 1974 but there is an ominous silence.

2. A difference of opinion had arisen between the State and Commonwealth governments as to which of them "owns" the natural gas and what price should be charged.

3. Industry, in general, is interested in the minerals and cheap power but is not convinced the full urban development is necessary or viable. The steel industry for example prefers to pelletise the ore on site and build its steel plants in more agreeable climates nearer to populated areas. They feel a pioneering development at the Pilbara would be costly, vulnerable to industrial action and critically dependant on transport systems. It appears to be thought that there is no urgency to create a 10 million ton a year capability at the present time since world capacity is under utilised. This could well change within 5 years and the lead time to design and build the new plant is of the same order, so one is left feeling the point is a red herring.

The Future

1. Industry would move in if a) the infrastructure was provided and b) a stable, average cost labour force were guaranteed.

2. Urban development etc. would follow as the demand for housing etc. grew. The quality, effieciency etc. of such a development would need to be determined once the requirements were known.

3. Families etc. would move there if the pay was good, housing recreation etc. attractive and a community environment already exited.

4. Someone must make the first move, probably it would be a government (state and / or commonwealth) initiated step with certain encouraging guarantees. It will be facinating to learn of the actual outcome.

5. If a start is made along the lines described, the situation could well be a ready made study area for IIASA.

WESTERN AUSTRALIA

THE PILBARA REGION

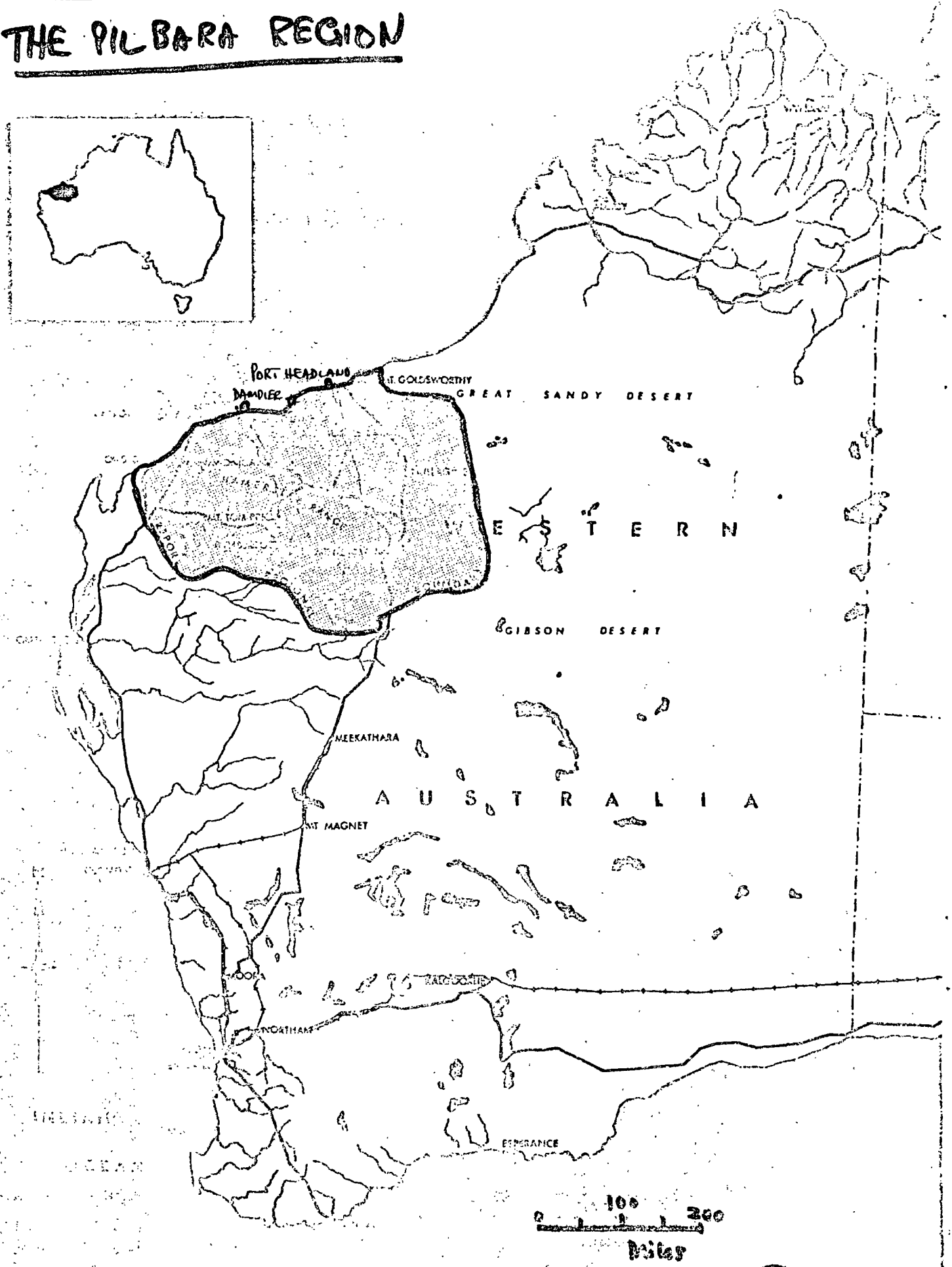

Figure 1