

# Land assembly in a fragmented land market through land readjustment

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## Abstract

Land readjustment has long been employed in Taiwan to supply land for urban development. It is widely believed that sites after readjustment are of a better size and are equipped with satisfactory public facilities, and so sites in a readjustment area are prime areas for redevelopment. However, this paper, based on a case study, argues that the current process of land readjustment in Taiwan does not guarantee the return of readjusted sites that meet the needs of individual development projects. Land readjustment in its current form might have improved the overall condition of land in a readjustment area. Nevertheless, at the level of individual sites, the effectiveness of land readjustment in promoting land development is questionable.

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## Fragmented land ownership and land readjustment

Land readjustment is “a technique for managing the planned development of urban-fringe lands, whereby a government agency consolidates a selected group of land parcels and then designs, services and subdivides them into a layout of streets, open spaces and serviced building plots, with the sale of some of the plots for cost recovery and the distribution of the remaining plots back to the landowners to develop or to sell for development” (Archer, 1992b, p 155). Doebele (1982) and Larsson (1993) are two noteworthy studies that provide comparative accounts of land readjustment in different countries. Land readjustment is generally regarded as a favorable alternative to traditional methods of land development given that sufficient legal and professional resources are in existence. In addition, there have been several reports in the literature of land readjustment experiences in countries such as Japan (Masser, 1984, 1987; Hebbert and Nakai, 1988; Sorensen, 1999, 2000, 2001), Indonesia (Archer, 1987, 1989, 1992a, b), South Korea (Doebele, 1979; Lee, 1987) and Taiwan (Lin, 1993). These studies tend to suggest that

land readjustment is a useful tool for promoting land use through the readjustment of fragmented land ownership, for it reduces the financial pressure on the government to provide public facilities and facilitates the equal sharing of the benefits and costs of a project. Sorensen (1999, 2001) has recently argued, however, that while land readjustment projects do clearly prevent sprawl within the project areas themselves, they tend to exacerbate the problems of sprawl at the city and regional level.

As in many other countries, land readjustment in Taiwan is seen as a device for improving the economic use of land and alleviating the financial problems faced by governments in providing public facilities (Lin, 1993). It is also regarded as one of the development patterns of urban planning (Hung, 1995). After the readjustment takes place, some landowners receive back a piece (or pieces) of land that is suitable for development in the sense that it is more or less rectangular and fronts on to a road and is roughly in the location of their previous holding. For landowners whose land after readjustment is too small (a standard will be set by the government for individual projects), they will be given cash as compensation.

Although land readjustment to a certain extent reduces ownership fragmentation, its effectiveness in

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promoting land development has been criticized (Jou, 1986; Lay, 1986; Yeh et al., 1998). For a plot with several co-owners, readjustment is not automatically empowered to convert the plot to where there is sole ownership as the individual landowner is not to be deprived of his right to his share. Furthermore, the size of the readjusted plots is determined on the basis of the proportion of land taken by the government, and not specifically with the future development in mind. Though land readjustment aims at promoting land development, the protection of the owners' right to land or the co-owners' right to shares on sites cannot be disregarded. From the perspective of land development, land readjustment partially, but not entirely, resolves the problems associated with small sites and co-ownership of sites. In short, after land readjustment takes place, the average sizes of the readjusted sites are likely to become larger than before and consequently more suitable for development. Nevertheless, it is still possible for co-ownership on sites to remain in place. Moreover, as the sizes of the readjusted sites are certain proportions of the original plots, there is no guarantee that individual readjusted sites will be suitable for future development in terms of their size, but with the help of land readjustment, the difficulties encountered in obtaining a site suitable for immediate development are at least reduced. However, due to the issues identified above, the extent to which the difficulty can be reduced is dependent upon the distribution of plot sizes and the structure of land ownership at the time when the land readjustment is taking place.

Using a case study of a land readjustment project in Taipei, Taiwan, it will be argued later in this paper that, first of all, land readjustment in its current form promotes land development at a project level, but not necessarily at the level of individual plots. Secondly, in order to secure suitable sites for development, distinct land purchasing strategies are adopted by different types of companies over time in line with their respective characteristics. Finally, neither sole ownership nor a site of suitable size is guaranteed through land readjustment, and this leads to land assembly not only before, but also during and after readjustment.

### Overview of the Neihsu land readjustment project

As outlined in the previous section, one of the main functions of land readjustment is to reduce the degree of ownership fragmentation so as to promote land development. In other words, land readjustment is potentially an effective tool for assembling land parcels. This is a common problem during the land development process, particularly in many Asian cities (Archer, 1989). In the process of land assembly, landowners are tempted to hold out their land for a high price—a price in excess of

the opportunity cost of the land (Posner, 1992; Epstein, 1993). Lin and Evans (2000) provide empirical evidence that people are willing to pay a premium for a larger plot mainly because assembling a number of contiguous small plots is costly and time-consuming, if not impossible.

The case under examination is the Neihsu land readjustment project located on the outskirts of the city of Taipei in Taiwan in which approximately 143 ha were included. Prior to the project, this area was primarily used for farming purposes. This project was aimed at providing industrial sites to accommodate scattered illegal factories within the city and also to supply residential sites (Taipei City Council, 1985). The project area consisted of 2006 plots owned by 1471 landowners; 306 plots covering 14 ha were government-owned, 1567 plots accounting for 124 ha were privately owned, 10 plots covering just 0.0658 ha were jointly owned by both government and private bodies, and the ownership of the remainder was unidentifiable. The majority of the readjusted sites were to be for industrial use with the remainder for residential use. In addition, reserve lands amounting to 12.98 ha were auctioned off for industrial and residential use.

Data were collected in June 1997 and provided by the Department of Land Administration of Taipei City Council. Data taken from the registration records included the status of ownership (sole ownership or co-ownership), the date of every transaction from January 1977 to June 1997, the status of the buyer(s) and seller(s) in every transaction (an individual or a company, and, if it was a company, whether it was a construction or a manufacturing company) and the proportion of the property transferred (the whole property or a part of it). The registration of real property transactions in Taiwan is obligatory, so the above data provide a reliable history of the plots and are a satisfactory source for our analysis.

Taipei City Council amended its city plan in April 1982 and January 1985, respectively, to convert farmland to industrial and residential land, and land readjustment was earmarked as the method for developing land in the amended plan in 1985. Between August 1988 and February 1990, the council enforced a prohibition against land transactions in the readjustment area to facilitate progress of the project. Consequent to the fulfillment of the land readjustment procedure, the location of the readjusted sites was finalized in June 1994, and the readjusted sites were then returned in 1995 to the original landowners. In addition, reserve land was auctioned off by the Council in October 1996 and April 1997, respectively, to recoup the necessary costs.

In 1985, when the land readjustment project was confirmed, the industrial and residential land uses were already legitimized. It is worth noting that, although the

planned use of the plots was altered, the precise locations of the readjusted plots after land readjustment was to have taken place would have been unknown until 1994. Between 1985 and 1994, the plots were land upon which new uses would materialize but with an uncertainty of their future locations after readjustment. During this period of time (except from August 1988 to February 1990), the uncertainty of the finalized locations would be taken into account by both sellers and buyers. Furthermore, even though the location of the readjusted land was disclosed in 1994, the sites would not be returned for development until 1995. When the readjusted sites were returned in 1995, they were no different from any other site in the market and could be immediately developed. The specific dates mentioned above significantly influenced the rights to the land of owners and so these specific dates were of importance to both sellers and buyers in their decision-making. The statutory process of land readjustment is depicted in Table 1, which highlights the contrasts between the various stages of the statutory process and their implications for land development. It is to be expected that sellers and buyers of plots will take account of

changes in the legal rights to land at different stages before making their decisions.

### Changes in size and number of owners for sites following land readjustment

As claimed earlier, land readjustment aims to provide sites suitable for development in terms of size and ownership. Table 2 compares the size and number of landowners for individual parcels before and after land readjustment. Following land readjustment, the average size of individual parcels significantly increases from 715 to 1076 m<sup>2</sup> and its standard deviation decreases. As a result of readjustment, the parcels become larger overall and differences in size among the parcels are reduced. All of these changes seem to be of benefit to land development. However, the average number of landowners on each parcel declines only slightly from 4.6 to just over 4, although the corresponding standard deviation also becomes smaller. Table 3 details the way in which landowners are distributed across sites. The percentage of sole ownership increases

Table 1  
Statutory process of land readjustment in relation to land development

Year	Stage	Implications for land development
82	Amendment of city plan	Conversion of farmland to urban land
85	Confirmation of LR project	Uncertain in finalized location of readjusted sites
Aug. 88 to Feb. 90	Ban on transactions	
94	Site locations finalized	Locations known
95	Sites returned	Ready for development
Oct. 96	Land auction	
Apr. 97	Land auction	

Table 2  
Parcel size and number of owners before and after land readjustment

Before land readjustment				When land readjustment completed			
Parcel size (m <sup>2</sup> )		No. of owners per parcel		Parcel size (m <sup>2</sup> )		No. of owners per parcel	
Average	S.D.	Average	S.D.	Average	S.D.	Average	S.D.
715.07	1482.9	4.66	5.82	1076.37	785.69	4.09	3.75

Table 3  
Number of owners on individual parcels before and after land readjustment

Before land readjustment			When land readjustment completed		
No. of owners per parcel	Frequency	Percentage	No. of owners per parcel	Frequency	Percentage
1	646	40.89	1	309	47.54
2–5	507	32.09	2–5	216	33.23
≥6	427	27.02	≥6	125	19.23
Total	1580	100	Total	650	100

but the overall ownership structure does not seem to be altered.

### Acquiring a development site through land readjustment

In order to gain an in-depth understanding of land development, critical actors that make development-related decisions at different stages are taken into consideration. The typical actors involved in the development process include the landowner, tenant, speculator, developer, investor, development profession, financial institution, planner, and so on (Lichfield, 1956; Goodchild and Munton, 1985; Healey et al., 1988; Adams, 1994; Cadman and Topping, 1995). Within the setting of land readjustment, this paper identifies three principal actors who take part in the development process. They are, respectively, the original landowner, the speculator and the developer. An original landowner refers to those owners who participated in land readjustment and were returned building sites, but did not initiate development on the sites themselves. Those who purchased sites from original landowners and later sold them off are recognized as speculators. A speculator attempts to gain from an increase in land value through transactions and does not materialize development. Finally, a developer is the one who carries out or commissions development on sites. In the former case, the developer is a construction company that builds houses for sale. In the latter case, the developer is a manufacturing company that needs a building for its own activities. In the case under consideration, some developers might also participate in land readjustment, but they are not regarded as landowners because they will have their sites developed at a later stage. Table 4 summarizes the characteristics of the three actors in the process of land development.

In addition to the classification of actors, land transfers are also categorized as either a transfer of whole ownership or of partial ownership. If a whole parcel is sold by a sole owner, the transfer is counted as a transfer of whole ownership. In contrast, if only part of a parcel is transferred, the transfer is regarded as one of partial ownership. In the former case, the seller must be a sole owner. The seller in the latter case, however, could either be one of several co-owners of a parcel or a sole owner who sells part of his parcel.

As the figures in Tables 2 and 3 show, land readjustment did not significantly lessen the number of

owners on a parcel, and so land assembly is therefore expected to take place. In the context of land readjustment, land assembly could mean different things at different stages. An objective of land readjustment is to fit fragmented land ownerships together, and thus several small plots that belong to an owner will be assembled through readjustment. What concerns an owner is the returned site. As a result, the location of an owner's several plots prior to land readjustment is not crucially important, but the total area of these plots is. As long as the overall size of these several plots after part of them are rendered to the government remains large enough, an owner is entitled to a readjusted site. However, if after readjustment an owner attempts to assemble his land with other sites, the locations of those sites become a crucial factor for consideration. Therefore, a developer will after readjustment need to assemble such land with other sites if the size of the readjusted site is not large enough for the desired development. A developer that needs adjoining sites must purchase them from neighboring owners.

A construction company is considered less likely to enter the market early on because of the uncertainty of finding buyers of houses in a future period. Construction companies face a high opportunity cost of holding vacant land. On the other hand, a manufacturing company is conscious of its future plan to establish a factory or an office. For manufacturing companies, the opportunity cost of holding vacant land is relatively low. As a consequence, manufacturing companies are more likely to enter the market at an earlier stage.

Fig. 1 shows that there were no transfers of a whole ownership to a construction company until 1991 and that the transfers mainly took place after 1995 when readjusted sites were returned to the owners. This is likely to have been the case because construction companies were generally reluctant to enter the market early for the reasons mentioned above. The majority of transfers of partial ownership occurred in 1988 before transactions were banned. In addition, transfers of partial ownership before completion of the land readjustment were only reported for three discrete years. As construction companies handle their negotiations with landowners in a professional manner, they might have attempted to purchase partial ownerships at low prices before assembling them together. The transfers distributed over three discrete years also suggest that construction companies might have intended to complete the transactions within a short period of time,

Table 4  
Three principal actors in land development process

	Original Landowner	Speculator	Developer
Characteristics	Participate in LR but not develop sites	Purchase sites from an original landowner and later sells it for profit	Carry out or commission development on sites

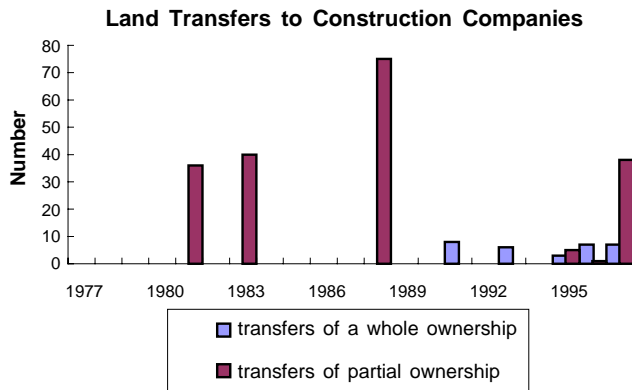


Fig. 1. Land transfers to construction companies.

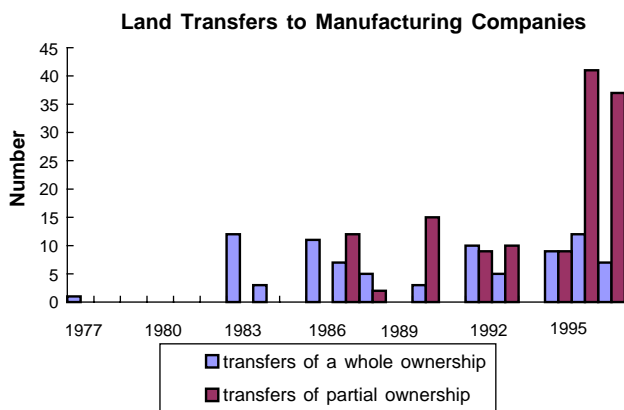


Fig. 2. Land transfers to manufacturing companies.

while possibly dealing with a number of co-owners at the same time. That is to say, construction companies made sure all partial ownership on a site would be transferred to them before the transactions materialized.

Fig. 2 shows that, in contrast to construction companies, manufacturing companies appeared to have adopted a different strategy. As far as the transfers of whole ownership were concerned, manufacturing companies came into the market much earlier than construction companies, as far back as 1977. Since manufacturing companies need land for their own use, the opportunity cost of holding a vacant plot of land is significantly reduced. The number of transfers of partial ownership to manufacturing companies reported again contrasts significantly with that in relation to construction companies. There were no transfers of partial ownership prior to 1987 and the transactions mainly occurred after 1995 when readjusted sites were returned.

### Acquiring a development site after land readjustment

At the time when readjusted sites were returned, 309 sites were owned by sole owners and the other 341 sites

were in co-ownership. Of the 309 sites in whole ownership, companies owned 30 of them and the original landowners owned the remaining 279 sites.

Because of the absence of complex ownership problems on sites involving whole ownership, such sites should be very tempting to developers. In less than three years, 56 of them were sold; 39 were transferred to developers and 17 were transferred to speculators in anticipation of a higher price. However, there were still 223 sites in whole ownership that had never been involved in any transaction.

With reference to the 341 sites in co-ownership, 77 of them had been sold. Moreover, 28 of the 77 sites had been purchased by developers and the remaining 49 by speculators. Purchases of sites involving partial ownership suggested that developers might be undergoing a laborious process of assembling partially owned sites. The transactions record shows that, in 18 of the 28 sites above where developers engaged in purchases of partially owned sites, all of the partially owned sites were assembled by developers who became the sole owners. Furthermore, as for transactions involving individual sites, all of the transactions occurred in the same year. Overall, the evidence shows that a number of developers were attempting to assemble partially owned sites over a short time period in order to reduce the risk associated with a protracted process of negotiation.

### Developers' strategies for securing a site

In order to understand developers' strategies in securing a suitable site for development, names of the companies which participated in the readjustment as well as those which later purchased readjusted sites were identified.

Of the 405 lists of readjusted sites,<sup>1</sup> developers appeared in 29 of them, including four construction companies and 18 manufacturing companies. It was noted that three construction companies and 10 manufacturing companies were already the only owners on their lists. That is to say, as far as these 13 companies were concerned, through the land readjustment process, they assembled together a number of plots or partially owned sites which had already been owned by them. As previously mentioned, one or even more readjusted sites would be returned to a landowner as long as the land he owned was above a certain size after the requested

<sup>1</sup> Each list included the details of the original land plots and their corresponding readjusted sites. For instance, on a list, the original plots A1, A2 and A3 were as a whole readjusted and became new plots B1 and B2. The details comprised the owners' names, the proportion of a plot that each owner or co-owner held, the locations of the plots, the sizes of the plots, the legitimate uses of the plots, and the appraised value of the plots and other aspects relevant to the owners' rights both before and after land readjustment.



Table 5

Transfer of sites to developers after land readjustment

Transfers to construction companies (sites)		
23		
Construction companies became sole owners (sites)		Construction companies became co-owners (sites)
21		2
Sites were purchased from single owners (sites)	Sites were purchased from several co-owners (sites)	
13	8	
Transfers to manufacturing companies (sites)		
44		
Manufacturing companies became sole owners (sites)		Manufacturing companies became co-owners (sites)
40		4
Sites were purchased from single owners (sites)	Sites were purchased from several co-owners (sites)	
25	15	

contribution had been taken. It is this feature of land readjustment that developers can take advantage of to ensure the availability of a site. The above argument appears to be confirmed by the fact that all of the participating companies at least had a site returned to them when the readjustment process was completed.

Apart from direct participation in readjustment, other ways in which companies could acquire a site included purchasing readjusted sites from the market or reserve land that was auctioned off.

Table 5 shows how sites were transferred to developers after land readjustment. Developers, both construction and manufacturing companies, appeared to prefer sites of a sole ownership to those of co-ownership. In addition, one and 18 pieces of reserve land, respectively, were sold to the construction and manufacturing companies through auctions. It is evident, therefore, that both construction and manufacturing companies favored sites involving sole ownership. However, due to the limited number of sites with whole ownership, the assembly of partially owned sites was inevitable.

As argued at the outset, even though the size of the readjusted sites was enlarged overall through readjustment, a readjusted site suitable for a company's specific development objectives was not guaranteed. As a consequence, companies might have needed to assemble a number of contiguous sites in order to serve their particular needs. It was found that one construction company was returned two readjusted sites and eight manufacturing companies were returned more than one site. What is more, six of the eight manufacturing companies above were returned contiguous sites. Another strategy for the companies to acquire sites of a larger size would have been to purchase a number of contiguous sites from the market after readjustment was completed. Three construction and 10 manufacturing companies were recorded as having engaged in this kind of land assembly. Furthermore, two manufacturing

companies purchased reserve land next to the sites that they already owned.

In conclusion, a number of construction and manufacturing companies were found to have carried out assembly of their partially owned sites that were spread over various plots throughout the process of land readjustment, and a significant proportion of them did succeed in obtaining at least one site that was wholly owned. By contrast, several companies of both kinds purchased sites from the market after readjustment, and the majority of them became sole owners. The auctions of reserve land provided another main source of sites with whole ownership. With reference to the problem of parcel size, because the sizes of the readjusted sites would not necessarily fit developers' needs, a significant proportion of the companies that participated in land readjustment were actually returned contiguous sites. Moreover, the strategy of pursuing a larger site by assembling contiguous plots was commonly observed in the market.

As we suggested, readjusted sites as a whole became more suitable for development but developers still needed to find parcels among them to satisfy individual needs. Therefore, if developers were indifferent to all readjusted sites, no significant difference would be expected between sites transferred to developers and those remaining in the hands of the original landowners or speculators. Based on this reasoning, Table 6 compares parcel sizes and the number of landowners between sites transferred to construction companies, manufacturing companies and those remaining under the ownership of the original landowners and speculators. No apparent difference is found between parcels transferred to construction companies and those transferred to manufacturing companies both in terms of parcel sizes and the number of landowners on the parcels. Compared to the parcels at the time when readjustment had just been completed, the transferred parcels were on the whole larger and had fewer

Table 6  
Details of parcels transferred to developers and others after land readjustment

Transfer to construction companies				Transfer to manufacturing companies				No ownership transfer			
Parcel sizes (m <sup>2</sup> )		No. of owners per parcel		Parcel sizes (m <sup>2</sup> )		No. of owners per parcel		Parcel sizes (m <sup>2</sup> )		No. of owners per parcel	
Average	S.D.	Average	S.D.	Average	S.D.	Average	S.D.	Average	S.D.	Average	S.D.
1688.694	1617.692	2.73913	3.595672	1694.142	1466.531	2.568182	2.085744	1006.02	989.767	4.238014	6.358624

Table 7  
Number of landowners on individual parcels among those transferred to developers and others after land readjustment

Transfers to construction companies			Transfers to manufacturing companies			No ownership transfer		
No. of owners per parcel	Frequency	Percentage	No. of owners per parcel	Frequency	Percentage	No. of owners per parcel	Frequency	Percentage
1	13	56.52	1	26	59.09	1	274	46.84
2–5	6	26.09	2–5	13	29.55	2–5	195	33.33
≥6	4	17.39	≥6	5	11.36	≥6	116	19.83
Total	23	100	Total	44	100	Total	585	100

landowners on them. This implies that, after readjustment, developers or speculators might have engaged in the assembly of parcels or partial-owned sites. It is also noted that the transferred parcels on the whole had fewer landowners on them than those still under the ownership of the original landowners or speculators. Table 7 provides additional evidence that transferred parcels had a higher proportion of sole ownership and a lower proportion of co-ownership than those parcels held by the original landowners or speculators. Such evidence all in all suggests that developers favored a larger site with a smaller number of landowners than those sites provided through land readjustment. The inevitable way of obtaining such favorable parcels was through assembling contiguous parcels or several partial ownerships on a site, and this is just what we found.

## Conclusions and policy implications

Land readjustment in Taiwan attempts to overcome the problem of insufficient land supply which primarily results from the prevalence of small parcels of land and partial ownerships of sites. The participating landowners' rights are safeguarded by laws, but the resulting distribution of adjusted sites might go against what developers desire. Land readjustment is only a partial solution. As a result, developers still have to find their own way in obtaining a favorable site for development.

Furthermore, the activity of land assembly was observed throughout the time period being analyzed. It was noted that, before readjustment, land involving partial ownership of a plot and partial ownership spread over several plots was assembled to ensure the right to a

readjusted site. Land assembly was also recorded after readjustment. A number of both construction and manufacturing companies purchased contiguous sites and also reserve land next to the sites that they had already owned. What gave rise to the assembling of land were the large number of sites with partial ownership on them and sites too small in size to facilitate development. As sites of a suitable size for development are not guaranteed through land readjustment, developers or speculators at different stages take advantage of land readjustment to assemble partial ownership of sites or contiguous parcels. This, then, is what the empirical evidence has demonstrated.

From the perspective of land development, the findings of this research at least highlight a number of policy implications for land readjustment. Much attention in Taiwan has traditionally been directed toward the physical improvement of readjusted sites, with little attention being paid to their economic or market aspects. However, every land readjustment project should be designed to make readjusted sites developable and marketable for development. Whether or not readjusted sites are ready for development does not simply depend on the availability of public facilities and their rectangular shape. It is the marketability of readjusted sites that matters most. Therefore, developers' preferences for sites need to be understood and incorporated into a readjustment plan. The government can solicit developers' opinions at some stage of the land readjustment process through public or private meetings, or even provide a venue for discourse between landowners and potential developers. In so doing, some development agreements might be achieved well in advance of the completion of the land readjustment.

This in turn might reduce land speculation caused by the lack of interaction between landowners and developers. In addition, incentives can be provided to encourage co-owners to voluntarily consolidate their partial ownership. Sites on which there is sole ownership can result in substantial savings in terms of the cost of development. It might be worthwhile paying compensation, at a rate higher than the market value of partial ownership and by using public money, to co-owners who voluntarily sell their shares to a single buyer.

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