ARROYO

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Many washes flow from desert into urban areas. (Photo: George Andrejko, Arizona Game & Fish Dept.)

Often Neglected, Urban Washes Now Seen as Attractive Resource

Washes and arroyos cut or carve patterns into desert surfaces and are as much a natural form of the Arizona landscape as serrated mountains. Meandering over much of the desert, their crevices help make up the texture and shape of desert lands. Indeed, even in developed and urbanized desert areas, washes and arroyos often remain a conspicuous feature, a natural remnant within the urban fabric.

In the past, however, urban washes were little valued; in fact, they were often perceived to be an urban nuisance. Washes gouged land that would otherwise be suited for the accouterments of urbanization – roads, businesses and dwellings. Further, they brought floods that threatened life and property. Land adjacent to urban drainage-ways therefore was thought to have little land-use value. Such areas acted as barriers to urban growth and development.

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Despite their problems, washes in urban areas served purposes that were perceived to be useful and practical, and for this they were appreciated. They acted as conduits to drain flood waters. They provided a source of sand and gravel and locations to dump unwanted materials and trash. Then, as is frequently true now, the practical benefits of preserving the natural conditions of washes were not readily recognized. An esthetics of urban washes had not evolved.

The Value of Urban Washes

"Wash" is a term that defies precise definition. Generally a wash is an ephemeral stream; i.e., a stream without a continual flow. Some rather large ephemeral streams, however, such as the Santa Cruz or the Salt, are termed rivers. Size therefore determines the river designation, although in most other respects such rivers are identical to washes. Watercourse is a more inclusive term.

Increasingly washes are being recognized as a valuable resource to benefit the urban setting. The environmental ethic that has emerged relatively recently has encouraged a perception of urban washes as a natural form to be preserved, protected, and, when necessary, restored. The occurrence of washes within an urban area provides various benefits.

An obvious benefit is that washes have the potential to provide city dwellers with a touch of nature. By offering a valued intrusion of natural habitat into urbanized areas, washes clearly contribute to the greening of the city. A natural wash in an urban setting helps demonstrate the premise that cities, especially western U.S. cities, have the resources to creatively blend natural and urban features to enrich the lives of those who live there.

As a proponent of this view, William W. Shaw of the University of Arizona's School of Renewable Natural Resources studied the occurrence of wildlife habitat within the Tucson area. He argues that wildlife is an important urban concern. In a sense, therefore, elected officials, planners, and developers are wildlife managers in metropolitan areas. Their actions affect the preservation and occurrence of wildlife within the city.

Shaw inventoried habitats remaining within the Tucson area to determine their viability to support wildlife. He indicates that the most sensitive habitats occur in association with Tucson's natural drainage system, its washes. In non-degraded areas, the network of washes provides an interconnected system of open spaces and supports native plant communities. This benefits such wildlife as quail, roadrunners, javelina, and coyotes that are able to live in close proximity to humans. Other Arizona urban areas may not share the same conditions. The main premise however is generally relevant: washes are often a preserve for desert flora and fauna within a city.

Related to the environmental benefits offered by urban washes are the recreational advantages. For example, washes form an interconnecting system of drainageways spread over an extended area. Their banks or channel beds therefore form a natural pathway for walking, jogging or hiking.

A city gains economic advantages with such environmental and recreational features. For example, studies demonstrate that property values increase in areas in proximity to recreational amenities such as hiking trails. Further, surveys have indicated that a prime factor influencing businesses to locate in Arizona is the availability of open spaces and abundant outdoor recreational opportunities. Urban washes can thus be an economic asset.

Washes can also be a natural form to guide the growth and development of a settlement or city. For example, native people who lived in this arid region often located their settlements along river banks. Here a reliable source of water was available in a pleasant environment.

Arriving well after the original inhabitants, some city planners still share their interest in washes as a focal point for development. Often prompting this interest is a dissatisfaction with the grid pattern of development common to most western cities. This development is often faulted as a synthetic overlay that ignores the natural forms and conditions abundantly, and often dramatically present in the West.

Some planners argue that the lines and patterns created by washes could be a natural form to guide city planning. As a low point of a watershed, washes reflect the land forms of an entire area and set a natural pattern for organizing urban development. The beauty and appeal of a city might well be enhanced if such projects as roads and housing were designed to be compatible with the cut and shape of area washes. The integration of washes into urban design is an intriguing but little practiced concept.

Urbanization and Washes

Previously, in areas that are now Tucson and Phoenix, virgin washes meandered through pristine desert. Various human activities, however, wrought major changes to wash areas, often despoiling their natural conditions. The land was grazed, and trees were cut. Settlements expanded into towns and cities, with desert lands converted to urban uses. Groundwater tables dropped because of increased pumping to support a growing population.

As urban conditions intensified other situations developed that further contributed to the degradation of

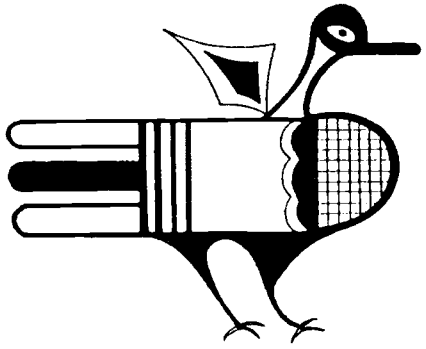
washes. For example, urban development increased the extent of impervious surfaces. Instead of percolating into the subsurface, rain now accumulates and runs off streets, sidewalks, parking lots and buildings and flows into washes. In an urbanized area, runoff is estimated to be four times that of a comparable undeveloped desert area. The drainage from the increased runoff that concentrates in rivers and washes accelerates the quantity and velocity of the flow on downstream reaches. Channels enlarge becoming deeper and wider, and damage from erosion becomes a greater threat.

Although damaging to many washes, the increased flow from urban surfaces actually benefits others. A comparison of photographs taken during different time periods demonstrates that certain washes have recently experienced increased size and density of vegetative growth. This new growth includes palo verdes, mesquites, and acacias. Contrary to the usual state of affairs, this is an example of an urban condition benefiting a natural habitat. Still hurting, however, are stands of deciduous trees such as cottonwoods. These trees rely on the watertable which has been dropping, despite the increased flows.

Along with the volume of water that flows off urban surfaces into washes, the quality of that water is also a concern, one that will need to be increasingly reckoned with. Washes in urban areas receive water carrying varying degrees of nonpoint source (NPS) pollution. This is a type of pollution not readily identified with a particular source.

Rainfall flowing over urban surfaces—streets, parking lots, landscaped areas, industrial sites—picks up various NPS constituents. These include sediments and debris from worn and weathered pavements and buildings; heavy metals and inorganic chemicals from transportation activities and building materials; and nutrients from fertilizers used on lawns and landscape vegetation.

Concerned about the quality of urban runoff, the Environmental Protection Agency has recently proposed rules and regulations for stormwater discharge. In effect, water quality standards are to be set for runoff into urban washes. Cities of a certain size will need to obtain a National Pollutant Discharge Elimination System (NPDES) permit for stormwater discharge by 1992. Authorized under the federal Clean Water Act, the NPDES program intends to control or eliminate the discharge of stormwater runoff pollutants to waterways.



San Ildefonso bird design

The Arizona Department of Environmental Quality is presently developing the stormwater standards. Since no specific stormwater standards exist, surface water standards are expected to become the basis for the NPDES permit. This has caused concern that developed stormwater standards will be excessively strict, a burden for municipalities and industries alike. Also feared is that excessively strict standards might affect the condition of urban waterways in various ways.

For example, reduced flows into washes may result. This could happen if stormwater treatment becomes necessary to meet strict water quality standards. This is an expensive process. As a result, stormwater may be diverted from flowing into washes and contained in retention basins rather than being released. Deprived of the flow, vegetation within washes could be adversely affected.

Some officials, however, question whether the regulation of stormwater will necessarily restrict its discharge into washes. Such officials claim that, although research in the area is limtied, researchers thus far have not detected excessive amounts of pollutants that would raise concerns under proposed water quality standards.

John Brock and Doug Green from the Arizona State University's School of Agri-Business and Environmental Resources are working on a project of relevance to the NPS pollution problem within urban washes. They are studying the chemistry of soils within urban riparian areas to determine how NPS pollution is affecting such locations. Their work also involves identifying vegetation with a potential to modify some of the pollution from urban runoff.

New water quality standards are also being proposed for discharges from sewage treatment plants. Here, too, concern is expressed that excessively strict standards could adversely affect the natural conditions of streams and washes. Such discharges have benefited riparian areas. If strict standards discourage discharges, riparian habitats could be affected, even destroyed. This situation poses a quandary for some people who must now consider tradeoffs in water quality to preserve riparian areas.

Flood Control and Urban Washes

Flood control and urban wash development are complementary issues. If understood in narrowly interpreted utilitarian terms, the purpose of a wash is to carry water. If this purpose is to be solely

served, then flood control efforts are best that enable a wash to more effectively carry greater amounts of water. Such strategies however are often environmentally destructive. The crux of the urban wash issue therefore is to devise a strategy to accommodate drainage needs, as well as preserve conditions essential for environmental and recreational amenities.

Different philosophies guide flood control strategies. Once thought to be a nuisance, stormwater was considered best managed and controlled if made to flow from an area expeditiously. To widen, straighten, and channelize were the preferred strategies to rid an area of floodwaters. Such methods are considered structural since they basically consist of physical modifications to adjust and change the flow of floodwaters. Structural methods include such measures as levees, floodwalls, channel improvement, and storage reservoirs.

Developers are generally strong supporters of structural flood control measures. Anxious to develop the maximum amount of land, they often advocate bank stabilization projects to control flooding and land erosion that would otherwise threaten development. With banks stabilized, more land is available to develop. For example, in planning its Rio Salado project, the city of Tempe estimates it can reclaim about 850 acres of land by creating a bank stabilized floodway channel within the Salt River. The reclaimed acreage is to be used for a multiple-use urban park.

With an increased concern about the environment, a wariness has developed about the physical changes or modifications that result from structural methods. Critics are questioning the effectiveness of structural methods to mitigate the adverse impacts of flood losses on the individual and community. For example, by directing and facilitating the flow of runoff, structural measures tend to increase the velocity of a flood. As a result, runoff is more quickly concentrated resulting in higher levels of inundation. This results in increased erosion of downstream banks and greater disruption of natural conditions.

Also flood control methods can reduce the esthetic appeal of an area and thus detract from its environmental and/or recreational uses. To most people, for example, a concrete-lined channel is much less appealing than a natural riverbed with vegetation. The latter inspires greater interest and use.

Assurances are therefore sought that whatever flood control strategies are employed will not despoil the valued natural conditions of a wash. This position has gained recognition to the extent that flood control projects are now often accompanied by mitigation efforts to reclaim degraded wash areas. In fact, federal guidelines require such actions in certain circumstances.

Actions and Policies to Preserve Urban Washes

Government agencies may take various actions that, although often primarily intending to control flooding and protect lives and property, also contribute to the preservation of urban washes. For example, a flood control district may buy up undeveloped floodplains upstream of an urban area. This helps to ensure that the area will not be developed and channelized with conventional structural flood control methods. Downstream flood peaks, therefore, are controlled. At the same time, however, the natural conditions of the wash are protected. Pima County has purchased about 5,000 acres for this purpose with flood control bond and levy money.

The issue of land acquisition also arises when washes are to be preserved or developed for recreation. Land adjacent to a wash is often needed for trails or other recreational amenities. This land is acquired in various ways. Pima County floodplain ordinance requires a fifty-foot dedication along improved major watercourses, mainly for access and maintenance purposes. The easement is also available for development as part of the Pima County linear park. When land is needed that is not part of an easement, Pima County purchases it. Also, Pima County may require developers to dedicate washes as a condition of rezoning.

A flood control district may help preserve washes by encouraging the development of master plans to guide development along watercourses. For example, the Maricopa Flood Control District is involved in developing a master plan for areas along the Salt and Gila Rivers. The plan contains several objectives to ensure the environmental quality of watercourses. For example, natural riverine habitats are to be identified for preservation. Also, a regional perspective for developing park and recreational facilities in the floodplain is to be promoted.

Conditions of rezoning can also be established to preserve the natural state of washes and are useful tools to implement the policies of an area plan. For example, a master plan might identify washes with a natural habitat to be maintained or enhanced. If the area is rezoned with such conditions, enforcement is thus prescribed. Some people are wary of rezoning, however, since it can go either way. Rezoning might also permit certain activities that are detrimental to natural conditions, such as concreting a wash.

The passing of ordinances is another strategy to protect urban washes. The city of Tucson has passed two such ordinances. One ordinance recognizes that unspoiled urban washes contribute to the health and well-being of the city's residents and describes measures to protect and

maintain the natural conditions of designated urban washes. Also, Scottsdale has recently passed an Environmentally Sensitive Land Ordinance that designates much of North Scottsdale, including its mountains, foothills and alluvial fans as requiring special zoning considerations. The ordinance includes natural open space incentives which discourage development from highly visible mountains and washes.

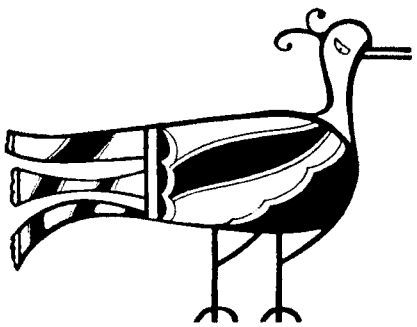
An individual property owner can protect the natural conditions of a wash by establishing a conservation easement along the watercourse. Conservation easements are restrictions landowners voluntarily place on their property or a section of it to legally bind present and future owners. It specifically prohibits certain activities – e.g, timber cutting, ditch digging, construction – to protect the habitat, flora, or fauna found on the land. A conservation easement might also provide a tax benefit to the property owner.

Different urban wash projects are in various stages of development within the state. What progress and success they demonstrate depend on a number of variables. Obviously, more than the natural forces of geology are at play. Political and social forces are also involved. A few such projects will now be described as case studies. They will demonstrate the issues involved when such work is undertaken and also convey the range and types of urban wash projects within the state.

Pima County River Park

Pima County is in the process of establishing a river park system along the banks of its major watercourses. The eventual goal is to develop up to 105 miles of linear river park along the Santa Cruz and Rillito Rivers and the Canada del Oro, Pantano, and Tanque Verde Washes. Thus far about 4 miles have been constructed.

The river park system is a component of a more grandiose trail design, the Eastern Pima County Trail System Master Plan. The latter plan intends to expand on the existing and planned river park system to connect with all major public lands in the area. Phase I of the plan designates a first priority network of 650 miles of trails, with linkages to public lands at more than 90 locations. Many of the proposed trails are to be along wash channels.



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Certain topographical conditions in the Tucson area favor the construction of a linear river park, along with the proposed trail extension. Tucson is surrounded by higher relief mountain ranges that are relatively unreduced by pedimentation; i.e. the development of broad platforms at the base of mountains. Higher dissected surfaces are therefore evident in which streams or washes are entrenched. Washes are generally well defined and fan out into branching patterns. The resulting system of washes forms the natural trail routes of a river park.

Not all Arizona areas have such features. Phoenix, for example, is located in an area of low, rolling topography, with fairly shallow bedrock. As a result, water flows over a broad surface in wide spread sheets. Concrete drainageways are constructed to collect the water before flowing into urban areas. As a result, Phoenix, unlike Tucson, lacks a well defined radial drainage pattern or an extensive network of washes that could be developed.

Plans call for the Tucson area park to extend along the major river banks in a 50-foot-wide corridor. This is expected to be sufficient space for vegetation and planned trails. Along certain sections, however, development has occurred close to the edge of a wash, leaving, at times, only 10 to 20 feet for parkland. The county owns some of the needed land, with other land to be purchased. Purchasing access land is a major expense of the project. Project funds are obtained from flood control tax levy money.

The river park project purports to restore the natural integrity of degraded river banks. Major rivers in the area would be revitalized to serve as appealing community attractions featuring environmental and recreational amenities. As a swath of natural life to stand in relief to urban forms and structures, the river park design has been referred to as a greenway or greenbelt.

A major feature of the river park design is the multiple use trail system. Separated from vehicular traffic, the trails are for pedestrian, bicycle, and equestrian uses. Also, the park is to provide for various activities and features: equestrian staging areas, drinking fountains and troughs, playgrounds, exercise equipment, shady rest areas, horticultural displays, interpretive features, restrooms and maintenance areas.

And, of course, the river park is to be an area with predominantly native vegetation. Where no vegetation exists because of degradation and misuse, various plants appropriate to the Sonora desert will be cultivated. Existing vegetation is to be preserved. In areas where vegetation needs to be disturbed, the mature vegetation is to be transplanted whenever possible.

The river park will be mostly in areas where urbanization has disrupted, if not destroyed, whatever wildlife habitat had existed. To help improve the setting, the wildlife types and species most likely to populate the river park are being identified. Strategies to enhance the habitats appropriate to those types and species are being developed, with the expectation that the wildlife will return to the area.

By implementing certain flood control measures Pima County became obligated to develop the river park. Under section 404 of the Clean Water Act, the Army Corps of Engineers is responsible for all tributaries to the navigable Colorado River. Since Tucson's ephemeral washes are designated U.S. waterways, Pima County applies for a 404 permit when stabilizing banks for flood control. Part of the 404 permit process requires that river parks be installed as mitigation measures to compensate for disturbed natural conditions.

Flood control is therefore the priority, a fact demonstrated by the county agencies involved in the project. Pima County Department of Transportation and Flood Control is designing and developing the river park. Later the parks will be turned over to Pima County Parks and Recreation for maintenance.

Critical comments about the river park include concern that the project, representing a mitigation strategy, is, in effect, an effort to compensate for an environmental loss that should never have occurred in the first place. Also criticized is the attempt at revegetation along the river banks. It has been described as sparse and having a tended, artificial appearance, not entirely true to natural conditions. Doubts are also expressed that linear parks can be sites of habitat restoration. At the same time, however, the river park is seen to represent an emerging appreciation of a vital natural attraction in the area.

Indian Bend Wash

Whereas Tucson claims environmental preservation as a prime purpose of its river park endeavors, the Indian Bend Wash project maximizes the recreational possibilities of a developed urban wash. The different directions taken by the Indian Bend Wash planners reflect in many ways different community preferences and interests. At the same time, however, the project demonstrates that urban washes can be developed to serve varied and creative intents and purposes.

The Indian Bend Wash runs southward through Scottsdale and a section of Tempe before flowing into the Salt River. The wash drains part of the McDowell Mountains as well as some pediment areas north of Scottsdale before cutting through the center of town. When dry, the wash was considered an eyesore, for it contrasted with the development occurring nearby. When vigorously flowing, a fairly regular occurrence, the wash was a hazard and a danger splitting the community and threatening life and property. What to do? Obviously some sort of flood control project was called for.

The Army Corps of Engineers proposed the traditional solution: a concrete lined channel. The channel would be seven miles long, about 23 feet deep and 170 feet wide. The people of Scottsdale in turn rejected this proposal. Through an organized community effort, an alternate strategy was proposed. This consisted of creating a greenbelt with varied recreational opportunities. Instead of a stark, functional concrete ditch, a community resource of multiple and varied benefits would thus be created. An innovative approach at the time, the greenbelt concept was eventually accepted as the guiding principle of the flood control project.

More than just two options to solve a flood control problem, the proposed solutions – a concrete ditch and a greenbelt – represented vastly different perspectives on urban design and development. That Scottsdale is a city with a relatively affluent and committed citizenry was no small matter in settling the affair to its satisfaction. The greenbelt was thus created.

Indian Bend Wash is a flood control project with built-in recreational facilities. Among the plethora of recreational opportunities are 300 acres of city parks, golf courses, swimming pools and fishing and boat lakes. Activities range from jogging to horseshoes to paddleboats. All facilities and equipment are designed for flood control. For example, tennis court fences break away and float with flood waters to return to normal positions when flooding subsides. Small lakes, which recharge groundwater, are designed and placed to slow rushing flood waters.

Basic to the park's development and operation were the expected economic benefits to Scottsdale. In fact, without the promise of economic gain, the project would unlikely be in its present form. And, as planned, the project has worked out to be an economic asset to the city. Because of its attractions, the Indian Bend Wash area is lined with high-cost, luxury apartments and condominiums. Also, businesses in proximity to the project greatly benefit. This growth and development are obviously to the advantage of the city's tax base.

Some critics express concern, however, that environmental uses are not adequately provided for, despite the much lauded multiple uses of the project. The natural conditions of the wash are said to be little evident, covered over by grass and recreational areas. Further, the project is criticized as a water consuming greenbelt. Some critics are thus prompted

to note that a desert greenbelt is in fact a contradiction in terms. In sum, various critics believe that environmental values got slighted in the project's commitment to other priorities.

To some extent the Indian Bend Wash endeavor stands as a model for the Tempe Rio Salado project. Developers of the Tempe project claim that the Rio Salado project will do for their city what the Indian Bend Wash did for Scottsdale. There are, however, significant differences between the two projects.

Plans for the Rio Salado project, which will develop land along the Salt River in Tempe, call for certain environmental features. Native vegetation and low-water use plant species are to be used. The project also proposes to create wildlife habitats and riparian landscape areas.

Flagstaff and Prescott Begin Efforts

Smaller urban centers of Arizona are also beginning efforts to reclaim the natural conditions of their creeks and washes disturbed by development and urbanization. Two such cities are Flagstaff and Prescott. The emergence of these efforts in such areas demonstrates an important fact; i.e., the adverse effects of urbanization are not confined to major centers such as Phoenix and Tucson. Further, the concern apparent in these cities demonstrates that sensitivity to the urban wash issue and the need to take action is evident in small urban areas as well as large population centers.

Flagstaff is located along the Rio de Flag, a river fed by ephemeral streams. Because of urbanization many of Flagstaff's streams and washes are severely degraded. For example, watercourses have been filled in, and the watertable has dropped in some areas resulting in the drying up of streams.

Flagstaff citizens have recently approved the sale of bonds for a reclaimed water treatment plant. The plant is to process wastewater and produce 3 million gallons of reclaimed water per day. Uses for the reclaimed water are presently being decided, with application on cemeteries and other grasslands expected.

The Northern Arizona Riparian Council (NARC) views the eventual operations of the treatment plant as providing an opportunity to reclaim riparian areas lost because of urbanization. The council is proposing that reclaimed water be released in areas where it would revive and benefit riparian habitats.

NARC's plan of action involves identifying locations where riparian communities previously existed. Studies would then be conducted to determine what the characteristics of these communities were. Finally, how such areas would benefit from a renewed flow of water would be ascertained.

NARC recently made an initial presentation before the Flagstaff City Council. It has been invited to provide further input during city council work sessions.

Activities to protect watercourses are also beginning in Prescott, a city with fairly abundant riparian areas. As defined by an involved citizen's group, the concern in Prescott is to preserve present stream conditions from the adverse affects of grazing and urban activities. The damages to Prescott watercourses are not considered to be as severe as in other areas of the state.

The quality of stream flow through Prescott is affected by situations both outside and within the city. Located in the headwaters above town, most of the riparian areas in the Prescott National Forest are listed as either in poor or fair condition by the U.S. Forest Service. Some people believe this situation is mostly the result of over grazing. Also, concern has been expressed that zoning in Prescott is not effective for protecting natural stream conditions. A further concern is that sewer lines are laid in streambeds. This results at times in inflow that overloads the system causing flooding. Leakage into streambeds has also resulted.

A recent Prescott general management plan recognized the importance of preserving the condition and quality of stream and riparian areas in Prescott. The document however was criticized as being too general and therefore ineffective as a policy guide.

The conservation committee of the Prescott Audubon Society is working to develop a proposal advocating the protection of creeks and washes within city limits. The proposal is to be submitted to the city and provide specific recommendations, including suggested zoning changes. It is hoped that the proposal will attract general public support and provide the incentive to pass appropriate legislation.

Also, a linear trail system along Prescott creeks is being planned and developed. The intent is to create a trail to link the city with the national forest. At the same time the trails are to encourage public appreciation of the city's riparian areas.

Conclusion

The issue of preserving and reclaiming urban wash lands is not one to be resolved along an urban-vs.-nature dichotomy, with advocates lined up on each side. Instead, the urban wash issue has the potential to demonstrate that, in the best of urban environments, the developed and natural can be complementary, each contributing to an attractive, safe, and creative human setting. In a broad sense, the issue has to do with designing an urban environment that is not inhospitable to natural and environmental features.

The quest then is not to return washes to their original natural conditions. Even to identify such conditions would be difficult, since modifications resulted from Indian, Spanish and U.S. occupation and use of the land. Watercourses have experienced too much degradation and abuse, especially during the last few years, to be fully reclaimed to original conditions.

The goal, therefore, is to restore the habitat to conditions that are compatible with the situation at present. Urban washes will need to serve urban and natural needs; in other words, multiple uses. These include wildlife conservation, flood control, groundwater recharge, scenic beauty, and recreation.

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