Form No. 10-300 (Rev. 10-74)

PH0695122

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

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SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC
Anasazi Sites Within the Chacoan Interaction Sphere Thematic Resources

AND/OR COMMON

2 LOCATION

STREET & NUMBER
See continuation sheet. __NOT FOR PUBLICATION

CITY, TOWN CONGRESSIONAL DISTRICT

__ VICINITY OF

STATE CODE COUNTY CODE

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	__PUBLIC	__OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	X UNOCCUPIED	__COMMERCIAL	__PARK
__STRUCTURE	X BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	X YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
X Thematic Group	__BEING CONSIDERED	__YES: UNRESTRICTED	__INDUSTRIAL	__TRANSPORTATION
		__NO	__MILITARY	X OTHER: Grazing

4 OWNER OF PROPERTY

NAME
Multiple ownership

STREET & NUMBER

CITY, TOWN STATE

__ VICINITY OF

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC. See individual nomination forms.

STREET & NUMBER

CITY, TOWN STATE

6 REPRESENTATION IN EXISTING SURVEYS Also see continuation sheet.

TITLE Chacoan Outlier Project (Public Service Company of New Mexico, New Mexico State Historic Preservation Office*, U.S. National Park Service) *formerly State Planning Office.

DATE November, 1977 - September, 1978 __FEDERAL X STATE __COUNTY __LOCAL

DEPOSITORY FOR SURVEY RECORDS Museum of New Mexico

CITY, TOWN Santa Fe, STATE New Mexico

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Chacoan sites and surrounding communities have been the subject of consideration since the very beginnings of archeological investigation in the American Southwest. Records of these sites begin as early as 1850 and as a result appear in diverse series of publications. An attempt has been made recently, however, by the Chaco Center of the National Park Service and by the New Mexico Historic Preservation Program, with the aid of Public Service Company of New Mexico, to integrate much of this information and to augment our knowledge of the Chacoan phenomenon through additional field reconnaissance.

The results of these attempts are present in a manuscript by R. Powers, R.W. Gillespie, and S. Lekson entitled, "Preliminary Investigations into the Chacoan Outlier System: A Functional and Regional Perspective" on file at the Chaco Center, Albuquerque, New Mexico, and within an up-to-date untitled manuscript by Michael Marshall and John Stein on file at the Laboratory of Anthropology, Museum of New Mexico, Santa Fe, New Mexico. Both of these studies are still in progress, with projected publication dates late in 1978 or early in 1979. This thematic nomination is primarily the result of these studies.

The only nomination presented in this preliminary package for thematic nomination which occurs on the National Register of Historic Places is the Casamero Site, LA 8779. Additional field reconnaissance of the Casamero area has revealed a constellation of sites about the house (LA 8779) and has resulted in the expansion of this nomination from a site to a district.

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	X UNALTERED	X ORIGINAL SITE
__GOOD	X RUINS	__ALTERED	__MOVED DATE September, 1978
__FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The properties proposed for thematic nomination herein represent the known "universe" of Anasazi-Chacoan communities which exist beyond the margin of Chaco Canyon National Monument. In this respect the properties may be considered as components of the "Chacoan Outlier System" (as described by Judge, James W., 1976, The Development of a Complex Cultural Ecosystem in the Chaco Basin, New Mexico). It is postulated that the social and political center of these outlying sites is the constellation of monumental communities which exists in Chaco Canyon National Monument.

Each of the properties suggested for nomination, whether a single isolated site or a large group of sites forming a community, contains a "public building", or "community center". These community centers often consist of multi-storied masonry apartment complexes containing large rooms, "blocked-in" and tower kivas. Isolated great kivas and great kivas associated with multi-storied houses are also known. When not occurring in complete isolation, these examples of "public architecture" are surrounded by a dense constellation of domiciliary houses. These communites and the public buildings are often quite massive, being among the most monumental and impressive of prehistoric cultural remains in the southwestern United States. An extensive network of developed routes known as "roads" has been recently defined, and links many of these Chacoan communities.

Characteristics of Chacoan Communities Ca. AD 950-1200

1. Ceramic materials are of PII and early PIII temporal affinity. Cibola White Ware and Gray Ware predominate. The Red Mesa B/W, Escavada B/W, Gallup B/W, and Chaco B/W types of the Cibola White Ware group represent the bulk of the decorated material. Intrusive Chuskan, Mesa Verdean, Tusayan, and Socorroan material may also occur, but in less frequency than the Cibola material. Culinary Gray Ware materials are dominated by corrugated-indented, sand and sherd tempered types. Intrusive Chuskan trachyte tempered and Mesa Verdean Andesitic or sherd tempered types may occur, but in less frequency. White Mountain Red Ware materials of Puerco B/R, Wingate B/R, and occasionally Wingate B/R and St. Johns Polychrome may also occur but appear in small quantities. Other occasional intrusives include Pilares Brown Ware, Mogollon Brown Ware, and Tsegi Orange Ware.
2. In most cases a constellation of small masonry unit houses clusters about a "public building(s)" which is usually situated in an elevated or central position. Occasionally a "public building" (i.e., Bonito Phase structure) may occur in apparent isolation, but in most cases such buildings are associated with a prehistoric roadway.
3. Public buildings of the "Bonito Phase" type are small to large (10 to 100 or more rooms) masonry houses, usually of multi-story construction, being terraced with a southeast exposure.
   a. The houses which appear in rectangular, E,C,D,F, and U shaped plans are apparently preplanned constructions, as there is usually no evidence of accretionary growth.
   b. The buildings are usually constructed of core-veneer masonry (massive, thick walls with Chacoan banded or nonbanded facings).
   c. Frequently "blocked-in" kivas of the Chacoan style appear within the house. These are X circular rooms with low benches and subfloor vents which are constructed within square or rectangular rooms. These kivas, although fully enclosed, are above-surface structures.
   d. These public houses often contain unusually large rooms with high ceilings (in comparison with surrounding village houses).
   e. Elevated and tower kivas which represent second and third floor circular constructions often occur in the back or north section of the block.

system's boundaries and through documentation of Chacoan communities peripheral to the Chaco Canyon proper. In addition to the previously mentioned known towns, work had commenced [redacted] in southern Colorado, [redacted] and [redacted] all substantial towns of obvious Chacoan affiliation. It became apparent to archeologists working with the Remote Sensing Laboratory (USNPS) that the large Chacoan communites [redacted] via a sophisticated system of "roads". Thus, in 1976 the Chaco Center initiated a survey designed to locate and document Chacoan communites (Powers, Lekson, and Gillispie). Due to time and budget considerations, however, only a select number of sites were visited by the Chaco crew. Thus, recognizing the urgency in locating and protecting these sites, the New Mexico State Planning Office in cooperation with the Public Service Company of New Mexico (PNM) initiated a survey (Marshall and Stein) designed in part to supplement findings of the Chaco crew. The State Planning Office (now New Mexico Historic Preservation Program)-PNM survey, however, is concerned specifically with location and documentation of Chacoan communities in order to: 1) provide badly needed information for management purposes, and 2) provide the necessary information for the nomination of those sites not already included in the National Register of Historic Places.

Survey Methodology

The information upon which this thematic nomination is primarily based is the result of recent archeological investigations conducted by the Chaco Center (Powers, Gillespie, and Lekson) and by the New Mexico Historic Preservation Program (Marshall and Stein). Both projects, which remain to date in progress, attempt to provide a synthesis of the known descriptive literature concerning the Chacoan Phenomenon with additional and selected field reconnaissance. Both projects, although independent, have been informally integrated in an effort to maximize data return and to reduce redundancies.

The ultimate objective to which these investigations are directed is to locate and basically define the nature of all known Chacoan communities of which a total of approximately 70 are now known. This basic definition involves a specific and detailed record of all "public architecture" (i.e., communities' centers) and an outline of the surrounding community. This site record may then be further illuminated by continued research.

The magnitude of these investigations has required a survey methodology of brief but specific format. Essentially all Chacoan communities which possess evidence of "public architecture" beyond the limits of Chaco Canyon National Monument are subject to consideration. In each case, the community center (i.e., great kivas, multi-story apartment houses, etc.) are subject to deatiled description. These descriptions include: site names and numbers, previous references, detailed locational data, physiographic situation, associated vegetation, site condition, cultural and temporal affinity, a detailed description and map of all physical remains, basic ceramic and lithic material data, and remarks concerning "roadways", irrigation facilities, and visibility. All cultural materials were studied in the field and returned to the site area.

In each case an effort to define the nature of the community surrounding the "center" is attempted. In certain sample cases (such as: Bisa'ani, Andrews, Pierre's, Peach Springs, Kin Nizhoni, Muddy Water, Casamero, Grey Hill Springs, and Indian Creek) a comprehensive statement of the community structure is attempted. In these sample cases, each site is individually considered for essential information. These essential data consist of: location, house description including form, size, and number of rooms, cultural and temporal affinity defined via ceramics, and midden location and size. Such comprehensive statements of community structure allow for accurate statements regarding community size and for evaluation, and are essential to the ultimate understanding of Chacoan culture.

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f. A large enclosed plaza area often occurs adjacent to the house. These plazas are either enclosed by a massive masonry wall or a single tier of single-story rooms and often contain one or more fully subterranean kivas.
g. Great kivas are most often closely associated with multi-story buildings. These kivas are usually isolated from the Chaco house but may occur in an adjacent position. These great kivas are primarily fully subterranean, being constructed of horizontal block masonary and having alcove or antechamber structures, encircling benches, elevated masonary hearths, and vaults, and massive wood or masonry roof pillars. These kivas range from approximately 12 to 27 meters in diameter.
h. Prehistoric "roadways" are often defined entering the community from various directions and these most often pass near or proceed to the public house.
i. Associated reservoirs for domestic water supply are often encountered near the community center.
j. Formal irrigation facilities such as main channels, laterals with gates, dams, and reservoirs are occasionally evident in farmlands adjacent to the community.

Historical Overview

Historically, the ruins of the Chacoan towns were the inspiration for myth and legend. Simpson, for instance, spent several days in 1849 wandering among the ruins of the Chaco. Awed by the superior architecture, he speculated that the ruins were built during the wanderings of Montezuma. That this was a popular misconception is illustrated in such misnomers as "Aztec" Ruin.

Following the military conquest of the Navajo, interest was soon generated in exploring the archeology of the San Juan Basin. Large scale excavation began early in the 20th century, financed by the Hyde Foundation, the National Geographic Society and the Smithsonian. Other groups, including the School of American Research and the University of New Mexico, continued excavations into the 30's and 40's. By midcentury several of the more impressive ruins, including Pueblo Bontio, Chettro Ketl, and Aztec had been extensively excavated.

The significance of the Anasazi ruins located within the Chaco Canyon proper, and the obviously associated and impressive towns of Kin Ya'a, Kin Bineola, Pueblo Pintado, and Kin Klizhin were recognized as early as 1907 when these sites came under the jurisdiction of the National Park Service. Excavations by Morris at Aztec, Twin Angels and elsewhere, and Roberts at Village of the Great Kivas illustrated that only a fraction of the Chacoan system enjoyed protection for later study. In 1971, on the eve of large-scale energy related development surrounding Chaco Canyon, the National Park Service, in cooperation with the University of New Mexico, established the Chaco Center. As much of the early excavations had been organized to obtain museum collections and begin data collection on chronological sequences, the Chaco Center was organized in order to synthesize extant information and ultimately to begin a program of intensive investigation of the Chacoan Phenomenon. Study began with a comprehensive inventory survey and excavation program within the boundaries of the National Monument. It was apparent, however, that understanding of the "Chaco Phenomenon" could only be facilitated through definition of the

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These comprehensive investigations of entire communities involve considerable effort and the complete definition of all known communities is clearly beyond the scope of the current investigations. Because of this, most of the communities are the subject of only cursory examination involving the definition of basic boundaries and site densities. Sufficiently detailed information has been collected to include 29 sites or districts in this nomination. The following is a list of these sites and districts with a description of their accessability, present condition, identified threats and recommendations for protection and preservation:

1. Andrews Archeological District

   Access: Restricted

   Condition: The Andrews Ruin has been reduced to rounded countours. Portions of the site have been disturbed by pot-hunting activity.

   Recommendations: This site apparently receives some visitation by the owner who now lives in Albuquerque. The section was given to her specifically because of the ruin, and was subsequently solidly fenced and posted due to mules which she desired to contain within the property. Dr. Bill Harrison, who has excavated elsewhere in the area is negotiating to excavate this ruin, apparently with the aid of foreign exchange students. This ruin should be purchased.

2. Bee Burrow Archeological District

   Access: Unrestricted

   Condition: Site is reduced, but standing walls remain. No recent pot-hunting is evident.

   Recommendations: [redacted] As such it is definitely endangered. Minimally it should be fenced and posted. Multiple posting is recommended for the associated community which is located at some distance from the main house. Bee Burrow itself is in need of stabilization.

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3. Bisa'ani Archeological District

Access: Unrestricted but remote

Condition: Bisa'ani is situated atop a pinnacle-like clay hill and is at present extremely unstable. Blocked-in Kivas overhanging a sheer drop make Bisa'ani an excellent example of Chacoan architecture in a spectacular setting. If left unattended the remaining masonry will soon collapse.

Recommendations: [redacted] It is recommended that Bisa'ani be, for the present, stabilized and posted. In the meantime a continuing effort should be made to guarantee the preservation of the ruin and the badlands which form its setting.

4. Casamero Archeological District (Ojos Techolotes)

Access: Unrestricted

Condition: Casamero has been extensively excavated, stabilized and posted.

Recommendations: Casamero receives a considerable amount of professional and non-professional visitation. Although the main ruin is stable, much of the community remains undocumented and unprotected. [redacted] A systematic, inventory survey is suggested in order to minimize data loss from indirect impacts resulting from construction in the area.

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5. Coolidge Archeological Site (Tadpole House)

Access: Unrestricted but remote.

Condition: Site is reduced to rounded countours and is stable. There is no evidence of potting.

Recommendations: As this site is relatively remote and located in the vicinity of a Navajo residence, it is not endangered. Posting is recommended.

6. Coyotes Sing Here Archeological District (Wingate 8-4)

Access: Unrestricted.

Condition: Site is reduced to rounded countours and is stable. A Navajo family resides in the immediate area and thus deters pothunting.

Recommendations: This site is not likely to be damaged by treasure hunters or heavy equipment in the near future. It should, however, be posted.

7. Crownpoint Archeological District (Muddy Water)

Access: Restricted

Condition: 3 "Bonito Phase" houses are included here. All are reduced to rounded countours and are stable. The lowermost house, house, however, was narrowly missed in the construction of an earthen tank. Likewise the associated great Kiva is in a vulnerable position.

Recommendations: The more conspicuous elements of this community should be posted. [redacted]ives in the immediate area should be advised of the presence of special features. This community would lend itself well to a detailed contour map; a necessity for future management.

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8. Dalton Pass Archeological Site

Access: Unrestricted

Condition: Site is reduced to rounded countours and is stable. The presence of Navajo families in the immediate area have deterred active pot-hunting.

Recommendations: [redacted] is currently undergoing rapid development this site should be considered endangered. Posting is recommended.

9. Fort Wingate Archeological Site

Access: Restricted

Condition: [redacted] There is evidence for recent pot-hunting within the roomblock. In general the site is reduced to a low mound and is stable.

Recommendations: This site should be back-filled and posted.

10. Great Bend Archeological District

Access: Unrestricted but remote

Condition: Site is reduced to rounded contours, and is stable and undisturbed.

Recommendations: The district should be posted.

11. Greenlee Archeological Site

Access: Unrestricted

Condition: This site is presently in good condition with some standing walls present.

Recommendations: Mineral development is beginning in the immediate vicinity of [redacted] At present a new access road has been constructed very near to the ruin. This site is in need of minor stabilization. We would recommend that the site be posted, fenced and monitored. The company leasing the area should be notified concerning this and associated ruins in the area.

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12. Grey Hill Springs Archeological District

Access: Unrestricted

Condition: Site is in good condition, relatively undisturbed with standing walls.

Recommendations: This site is beginning to receive some nonprofessional visitation due in part to a well traveled road in the immediate vicinity. This site is definitely in need of stabilization and should be posted.

13. Halfway House Archeological Site

Access: Unrestricted

Condition: Site is in good condition and reduced to rounded countours. Only minor disturbance was noted in the area.

Recommendations: This site should be posted.

14. Haystack Archeological District

Access: Unrestricted. Site is adjacent to a well traveled road and receives some visitation.

LA6022

Condition: Site is reduced to rounded countours and stable. Navajo families reside in the site area and there is little evidence of potting.

Recommendations: The site should be posted.

LA12573-A

Condition: In addition to minor potting this site has been partially destroyed by heavy equipment. In general however, the site is stable and has not been disturbed recently.

Recommendations: This site should be posted.

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15. Hogback Archeological District

Access: Unrestricted

Condition: The Hogback site and associated community is currently in good condition but reduced to low mounds with rounded countours. Only minor disturbance was noted in the area.

Recommendations: [redacted] Because of this close proximity to industrial activity, the Hogback community should be considered endangered. Multiple posting and surveilance are recommended.

16. Indian Creek Archeological District (Casa Cielo)

Access: Unrestricted

Condition: Some standing walls remain, no pot-hunting disturbance is evident. Site is in good condition and is stable.

Recommendations: This site needs minor stabilization and should be posted. Other associated sites in the vicinity, including Casa Abajo should also be posted.

17. Kin Nizhoni Archeological District

Access: Restricted

Condition: Kin Nizhoni shows evidence of moderate disturbance due to pot-hunting activity. Generally, however the main ruin is stable and seldom visited. The associated community has been severely disturbed by pot-hunting and drilling activity. Numerous midden deposits have been overturned for pots, often leaving human remains scattered on the surface.

Recommendations: Both Kin Nizhoni and associated community should be posted. Kin Nizhoni is a need of minor stabilization and backfilling.

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18. Lake Valley Archeological Site

Access: Unrestricted

Condition: Site is bisected by a well traveled (Bladed) road and has been substantially potted.

Recommendations: It would be very difficult to control access to this ruin. The unexcavated portion of the roomblock should be professionally excavated and then stabilized or backfilled. Although relatively unspectacular, this ruin is possibly related to the prehistoric road system centered in Chaco Canyon. The site consists of 2 small houseblocks associated with a phenomenal amount of midden deposition. This site warrants further investigation to establish relationships with the road system etc. Recommendations concerning the preservation of this ruin should be based on these findings. In the meantime the site should be posted.

19. Morris No. 41 Archeological District

Access: Restricted

Condition: The sites have been reduced to rounded mounds. The site is stable but extensive vandalism has occurred in portions of the district.

Recommendations: The area is in the process of being sold to a private party for the purpose of commercial vandalism. An effort should be made to prevent the sale.

20. Peach Springs Archeological District

Access: Unrestricted, immediately adjacent to Navajo Route 9.

Condition: The site is reduced to rounded contours and is stable. There is no evidence for pot-hunting.

Recommendations: Although this site is presently in good condition it should be considered endangered. Stock facilities in the area have resulted in increased traffic over the mound. At the very least the site should be posted. Should industrial development be accelerated in the vicinity the site should be fenced or barricaded.

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21. Pierre's Archeological District

Access: Unrestricted but remote

Condition: Site is in good condition. Only minor disturbance is in evidence.

Recommendations: Site is already posted. Needs minor stabilization.

OK 22. San Mateo Archeological Site

Access: Generally unrestricted

Condition: The San Mateo Ruin is reduced to rounded countours and is stable. Despite its location near to the town of San Mateo the ruin is seldom visited and shows only minimal signs of recent disturbance.

Recommendations: The San Mateo area is currently undergoing rapid development [redacted] This ruin is one of the largest Chacoan sites recorded south of the Canyon. This site is definitely endangered and should be purchased. The site area should definitely be posted. Minor stabilization and back-filling should be considered. This site is one of the larger and more impressive ruins outside of the Canyon Proper. It is definitely endangered and should be purchased.

23. Casa De Estrella Archeological Site (Section 8)

Access: Unrestricted

Condition: Site has not been pot-hunted. Some standing walls remain.

Recommendations: This site is located in the vicinity of heavy industrial activity. Posting and fencing are therefore recommended. Standing walls are definitely in need of stabilization.

24. Skunk Springs Archeological District

Access: Unrestricted

Condition: Site is reduced to rounded countours and is stable with only minor disturbance noted. Portions of the site have been utilized as a dump for old autos and domestic refuse.

Recommendations: The Skunk Springs ruin is a conspicuous mound on the margin [redacted] Although Navajo families in the area are likely to deter any pot-hunting activity this site should be posted. In addition, the site area should be cleaned and perhaps fenced. A substantial community is associated with LA 7000. This community is presently cut in several places by contemporary auto roads and is therefore especially vulnerable to destruction by heavy equipment etc. As the Skunk Springs site with associated community, and Crumbled House with associated community, occupy adjacent valleys within a limited and bounded area, it is suggested that the area be managed as a district and posted accordingly.

25. Standing Rock Archeological District

Access: Unrestricted

Condition: Site is reduced to rounded countours and is stable. Pot-hunting in the area is minimal.

Recommendations: Site should be posted.

26. Twin Angels Archeological Site (Kutz Canyon)

Access: Unrestricted

Condition: This ruin was almost totally excavated by Morris (Report by Carlson). Recent minor potting is evident.

Recommendations: The site is in need of stabilization and should be posted.

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27. Upper Kin Klizhin Archeological Site

Access: Unrestricted

Condition: Condition of the ruin is good with little or no disturbance in the area. Some standing walls remain.

Recommendations: This site requires minor stabilization. It should definitely be posted and fencing might be considered.

28. Whirlwind Lake Archeological District (Whirlwind House)

Access: Unrestricted

Condition: The site is reduced with some standing walls. There is little or no evidence for pot-hunting activity.

Recommendations: Site is in need of minor stabilization and should be posted.

29. Willow Canyon Archeological District (Weavers House)

Access: Unrestricted but remote

Condition: This district consists of an excellently preserved example of the Pueblo I period in the San Juan Basin. Weavers house, including the surrounding community is reduced but stable with large upright sandstone slabs still standing.

Recommendations: This concentration of sites is remote and not in immediate danger of being disturbed. Posting is recommended for Weavers house.

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW			
X PREHISTORIC	X ARCHEOLOGY-PREHISTORIC	X COMMUNITY PLANNING	__ LANDSCAPE ARCHITECTURE	X RELIGION
__ 1400-1499	__ ARCHEOLOGY-HISTORIC	__ CONSERVATION	__ LAW	__ SCIENCE
__ 1500-1599	X AGRICULTURE	X ECONOMICS	__ LITERATURE	__ SCULPTURE
__ 1600-1699	X ARCHITECTURE	__ EDUCATION	__ MILITARY	__ SOCIAL/HUMANITARIAN
__ 1700-1799	__ ART	X ENGINEERING	__ MUSIC	__ THEATER
__ 1800-1899	X COMMERCE	__ EXPLORATION/SETTLEMENT	__ PHILOSOPHY	X TRANSPORTATION
__ 1900-	X COMMUNICATIONS	__ INDUSTRY	__ POLITICS/GOVERNMENT	__ OTHER (SPECIFY)
		__ INVENTION		

SPECIFIC DATES

BUILDER/ARCHITECT

STATEMENT OF SIGNIFICANCE

The Chaco-Anasazi archeological properties nominated herein and any proposed for later addition to the thematic group represent a prehistoric cultural resource of outstanding value and significance. The archeological properties proposed for inclusion within the thematic nomination represent the known "universe" that constitutes Chacoan civilization beyond the margins of Chaco Canyon National Monument. The sites nominated herein may represent as little as 10 percent of all prehistoric Chacoan communities.

Most of the nominated properties enclose entire communities which had rather dense populations. These communities consist of a constellation of domiciliary houses of moderate scale about an often monumental public building, or buildings, such as multi-storied masonry room complexes and great kiva structures. The size of these communities and their rich and elaborate artifact content certainly indicate a sedentary culture of substantial development.

The properties proposed for inclusion within the thematic nomination substantially represent "Chacoan Civilization". These are a group of finite, nonrenewable cultural resources which are primarily undisturbed. The pending development of energy resources, however, opens the properties to possible destruction. The looting of these properties as a result of increased access and inflated values of artifact materials on the antiquities market will increase. It is therefore most urgent that these valuable properties be protected by the state and national governments.

The value of these properties to the science of archeological inquiry and related fields is obviously substantial. These properties represent an untranslated library of an extinct civilization, the contents of which are as yet substantially unimagined. The knowledge of Chacoan culture which has been accumulated over the last century is, at best, fragmented and nebulous. Only the detailed examination of the entire system will allow for an accurate translation, and this is dependent upon the preservation of cultural resources.

The impressive character of these monuments certainly has great educational and recreational value to the general public. This is manifested in the success of such developed properties as Salmon Ruin, Aztec National Monument, and Chaco Canyon National Monument. Numerous other Chacoan properties possess a similar potential for educational and recreational development. Many of these properties exist in regions such as the Red Mesa Valley, the southern San Juan Basin, the eastern Chuska Mountain slope, etc., where no such educational facilities exist and where public access is feasible.

The ultimate educational and recreational development of certain selected Chacoan properties could aid local economies in terms of tourist visitation and wage labor. This is of considerable importance, since most of the properties exist in areas of decided underdevelopment with high unemployment and low per capita income, especially on the Navajo Indian Reservation. Furthermore, many of the ruins could be prepared for visitation with slight development and initial cost.

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It is most probable that archeologists will wish ultimately to investigate many of the properties through excavation. Such excavation will bring considerable funds into the region via wage labor and the purchase of local goods. Such projects have and will continue to aid deprived local economies.

The Chacoan properties proposed for thematic nomination certainly represent a monument to the lives and industry of the Puebloan peoples. In this respect, the properties provide a focus for modern Pueblo cultural-historical Awareness. The Pueblo peoples of today recognize these ruins as an important aspect of their cultural heritage and no doubt would support any efforts toward the preservation of this heritage. Furthermore, many of the ruins are considered as sacred areas by local Puebloan and Navajo inhabitants. This concern for preservation expressed by Native Americans is also shared through the aesthetic appreciation of the properties by Anglo American scientists, artists, and laymen.

Research Topics

Current anthropological thought views human behavior as adaptive in nature. Thus, archeological remains, though static, are inherently informative about the once dynamic system which resulted in their deposition. Documentation of the outlying Chacoan communities constitutes a major contribution to the available data for the interpretation of the Chacoan system. Several important categories of information are anticipated during the basic documentation phase of the survey. Briefly, these center around community structure and public architecture. A detailed list of basis information categories follows:

a. Information pertaining to house size. Documentation of differences between the compact "house" and the dispersed community.
b. Information concerning community development and evolution of the community.
c. Information concerning community "plan". Documentation of internal relationships within the community.
d. Information concerning inter-community relationships, including community location and "roads".
e. Assuming Chaco Canyon to be the social and political center of the system, information pertaining to the relationship of the community with the canyon via "roads", etc., is necessary.
f. Information concerning characteristics of "frontier" communities. When and where does a community cease to be Chacoan?
g. Information pertaining to the relationship of the community to available resources; i.e., water, soils, economic wild plants, lithic sources, etc.
h. Information pertaining to subsistence, agricultural technology, food exchange, relations between communities, construction of reservoirs, etc.
i. Thorough documentation of entire communities should ultimately result in reliable population estimates.

During the course of the New Mexico Historic Preservation Program-PNM survey, it became apparent that the structures commonly referred to as Chacoan "outliers" were in actuality some form of public facility providing a focus for an otherwise dispersed community of single-story dwellings. The public structures were multi-storied, characterized by elevated

(over)

kivas, large blocked-in kivas, plazas and large rooms, and often great kivas were present. Some categories of information regarding the evolution of Chacoan public architecture might be as follows:

a. Information pertaining to the evolution of the great kiva.
b. Information pertaining to the distribution of the great kiva.
c. Information concerning the function of the great kiva as a public facility.
d. Information pertaining to the evolution of the multi-storied public structure and the coincidence of those structures with great kivas.
e. General information regarding the placement of the public facility within the community. Often, centralized locations and elevated positions are apparent.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

See continuation sheet.

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY ______

UTM REFERENCES

	ZONE	EASTING	NORTHING		ZONE	EASTING	NORTHING
A				B			
C				D			

VERBAL BOUNDARY DESCRIPTION

All of the properties proposed for nomination which occur herein are located within the boundaries of the State of New Mexico. The properties are concentrated in the northwestern portion of the state, being within the counties of Valencia, McKinley, and San Juan.

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE

See continuation sheet.

ORGANIZATION | DATE

STREET & NUMBER | TELEPHONE

CITY OR TOWN | STATE

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL X   STATE ___   LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE Thomas W Merlan

TITLE State Historic Preservation Officer   DATE 1-10-79

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

Acting W. Ray Luce   DATE 10/10/80

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION

ATTEST: for Joy A. Bush   DATE 9/2/80

KEEPER OF THE NATIONAL REGISTER

Form No. 10-300a
(Rev. 10-74)

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DATE ENTERED OCT 10 1980

The following references pertain to sites and districts proposed for nomination in the preliminary thematic package. References include only those which provide specific information which is of assistance in evaluating the properties and do not include general or synthetic references.

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An important discussion, which may be considered a supplement to Part 8 of the thematic nomination, is:

Judge, W. James, 1976, "The Development of a Complex Cultural System in the Chaco Basin, New Mexico" (on file at Chaco Center, National Park Service, P. O. Box 26176, Albuquerque 87125)

A copy of this paper is appended.

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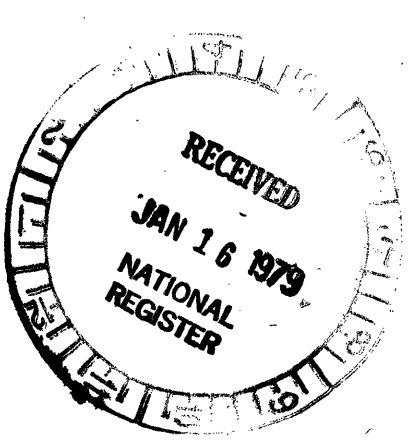

The Development of a Complex Cultural Ecosystem in the Chaco Basin, New Mexico

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Paper Submitted to the First Conference on Scientific Research in the National Parks

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The Development of a Complex Cultural Ecosystem in the Chaco Basin, New Mexico

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I. THE EXISTING DATA BASE

A. Cultural Summary

The archeology of Pueblo-III (Hosta Butte, Bonito, and McElmo Phases) in Chaco is fairly well-known (see Vivian and Mathews, 1964 for a summary). Research since 1971 by the Chaco Center has helped clarify the earlier time periods. Recent archeological survey (Judge,1972, Hayes 1975) has located some 2400 sites in the area. Although this is seemingly a large number, the Anasazi site density of 31 sites per square mile is less than half that found in the Mesa Verde area ($81/m.^2$). In terms of absolute population, Hayes has calculated that during the peak reached in the Bonito Phase, as many as 5600 people may have inhabited the canyon (1975:Fig. 26).

Early sites in Chaco Canyon are similar to contemporaneous sites elsewnere in the Southwest. Basketmaker-III sites tend to be quite typical, consisting of clusters of pithouses with an associated great kiva in some cases. Pithouses have antechambers and, frequently, external storage cists on the surface. The architectural transition to Pueblo-I, involving the shift to storage room/ramada areas behind the pithouses, dates in the 9th century AD (Windes 1976, Truell 1976). Absent in Chaco are the very large Pueblo-I villages found elsewhere in the Four Corners area (cf. Brew 1946).

Around 900 AD, or perhaps earlier, the architectural and ceramic transition to Pueblo-II takes place, accompanied by an increase in site frequency and increased evidence of trade. From this time until the abandonment of the canyon in the 13th century, cultural change accelerates rapidly in Chaco. Full surface

dwelling is acheived quickly, as is the transition from pithouse to kiva. Although direct tree-ring evidence is lacking, it is possible that the Hosta Butte Phase sites may have been started at this time or slightly later (e.g., the last half of the 10th century), resulting in full masonry kivas enclosed by a surrounding room block. Tree-ring clusters show evidence of initial construction at four of the "classic" Chacoan sites--Kin Bineola, Penasco Blanco, Pueblo Bonito, and Una Vida--between 900 and 950 AD, and this evidence is generally confirmed by associated masonry styles.

By 1050 AD, if not before, the transition to Pueblo-III was complete in Chaco. At Chetro Ketl, a classic Bonito Phase site, some 380 tree-ring dates have been collected, making it the most completely dated site in the area (Hawley 1934). Clusters of dates indicate that construction at Chetro Ketl started around 990 AD and it was expanded to roughly its present configuration during an extensive building period between 1038 and 1054 AD. Although less well-dated, there is some evidence that Hungo Pavi also may have been constructed during the same period of time.

Another major building period, perhaps the most intensive in Chaco's prehistory, took place between 1055 and 1083. It was at this time that Pueblo Bonito acquired its present appearance. In addition, tree-ring clusters show contemporary building activities at Pueblo Pintado, Una Vida, and Penasco Blanco, as well as several other sites (Bannister 1964). In short, the 11th century in Chaco saw the construction of at least seven of the 13 classic Bonito Phase sites. These seven sites alone comprise an estimated 2,227 rooms, or an average of 318 rooms per site. Many southwestern sites contain as many rooms, however the size and construction techniques of Chacoan rooms makes them virtually unique. The quality of masonry is almost certainly superior to that found elsewhere in North America, and approaches or equals that encountered in Mexico and

the Andes. In terms of size, "small" Chaco rooms average 16-18 square meters, while rooms in other southwestern sites average about 7 to 9 square meters. Chacoan builders used ponderosa beams generally, with some Douglas Fir, and evidence suggests that these might have been stockpiled and dried prior to use. Further, evidence from many of the sites reveals carefully planned, well-designed constructional units. Little, if any, growth by accretion took place during that period. Thus it is the rapidity with which construction took place, as well as the size and quality of the rooms built, that makes Chaco's Bonito Phase unique to Southwestern prehistory.

A final building period in Chaco took place early in the 12th century. By 1124, according to the tree-ring clusters, most of the classic sites had been completed, including the major Chacoan outliers. These "outliers" consist of sites physically separated from Chaco Canyon, yet exhibiting Chacoan masonry, Chacoan ceramics, great kivas or tower kivas, and connections to Chaco by means of a roadway and visual communication system (Drager 1976). They lie as close as 13 km., and as distant as 70 km., from Chaco Canyon. Recent research by the Chaco Center suggests that there may have been as many as 30 Chacoan outlying sites (Powers, et. al. 1977). Taken in conjunction with the 13 Bonito and McElmo Phase sites located in the canyon proper, a possible total of 43 major sites may have interacted during the 1000-1200 AD classic period. Hayes (1975) has estimated room counts on 24 of these sites, and arrived at a total of 3,956 rooms. Given this, and the assumption that a fixed ratio exists between room frequencies and population, it is easy to see why a relatively large increase in population has been suggested for the Pueblo-III period in the Chaco area (Hayes 1975:93).

The last tree-ring date from the Anasazi occupation of Chaco Canyon is 1178 AD from a firepit in the fill of a room at Kin Kletso. Hayes (1975) feels

that there was a definite late occupation of the Canyon by Mesa Verde immigrants until the middle of the 13th century, but this did not rival in size the earlier Bonito/McElmo Phase population. Thus the classic occupation of Chaco Canyon was a very short-lived, yet intensive, phenomenon.

Mentioned earlier was a roadway system connecting the outlying Chacoan sites with those in the Canyon. Although Chacoan "roads" have been known for some time (Holsinger 1901, Judd 1954, 1964, Vivian 1972), defining the extent and location of the road network as a system has been the result of combined research by the Chaco Center and the Remote Sensing Center (Lyons & Hitchcock, 1977). In the absence of wheeled vehicles and draft animals, the presence of wide (up to 9 meters) roads is difficult to explain. Yet there may have been as much as 200 miles of roads in the Chaco network during the Bonito Phase, connecting Chaco with its outliers, and connecting at least several of the outliers themselves. Some roads are masonry lined, others are merely troughs cleared in the sand, visible primarily on the horizon or on aerial imagery. They extend in generally straight lines with abrupt bends when necessary. An associated carved step/stairway system is present at cliff or shelf edges. It is virtually impossible to date the roads, although associated sites indicate heaviest use during the Bonito Phase. As paths rather than formal roads, however, these routes may have considerably more time depth.

B. Evidence of Trade in Chaco Canyon

Internal Trade

The term "internal trade" refers to those items that were brought into Chaco from areas within the Chaco region. Recent work on the analysis of ceramic temper types by Helene Warren at the Chaco Center has demonstrated that by far the majority of the pottery recovered archeologically in Chaco Canyon was not made there. Up to 80% of the Basketmaker wares were imported from the Cibola area

to the southwest. During Pueblo-II times, up to 90% of the wares were imported, the decorated vessels from the Red Mesa Valley to the south, and the utility wares from the Chuska area to the west. At no time does the local manufacture of pottery exceed about 20%. In general, Warren (1976) concludes that utility and decorated wares were produced independently by different potters in different geographical locations, anywhere from 15 to 70 miles away. Her research is based on the analysis of temper types which come from deposits not known to exist in the Cliffhouse or Menefee formations outcropping in Chaco Canyon.

A similar situation exists for many of the lithic artifacts recovered from sites in the canyon. Materials known not to occur locally include varieties of chert, chalcedony, petrified wood, quartzite, and obsidian used in the production of chipped stone implements, as well as types of igneous rocks used for ground stone tools such as axes. In most cases, the source areas of these materials have been identified.

External Trade.

External trade items are those which are known not to occur natively within the Chaco Region. These include turquoise and shell items, copper bells, and macaws. The frequency of turquoise artifacts recovered from Chaco is much higher than that from other southwestern sites. Literally hundreds of thousands of pieces were found in Pueblo Bonito, most in the form of beads. The abundance of turquoise found in Chaco, as well as the positive archeological evidence of bead manufacture there, strongly suggests its use as a medium of exchange during the Bonito Phase. Turquoise does not occur in the Chaco Basin. The nearest source known to have been mined prehistorically is that at Cerrillos, New Mexico, about 115 miles southeast of Chaco Canyon. The Cerrillos area is suspected as a primary source and trace element studies are now underway to confirm this. Neutron activation analysis has shown that turquoise obtained from Chaco is mineralogically

similar to some obtained from Mexico (Weigand, n.d.), indicating trade of the material between the two areas.

Over 1300 shell artifacts are known from Chaco. The majority of these (over 90%) are olivella shells which were strung as "necklaces". Bracelets made from glycymeris shells were also found, as were beads and pendants of several other species. Although these items are quite commonly found in other southwestern sites, they do indicate trade with coastal areas.

A total of 34 copper bells, cast by the lost wax method, have been recovered archeologically from Chaco Canyon. Since the working of copper was unknown to the prehistoric Southwest, these also provide direct evidence of trade with Mexico. A total of 23 scarlet macaws (Ara macao), 21 green macaws (Ara militaris), and 7 thick-billed parrots (Rhynchopsitta pachyrhyncha) have been found at Chaco, primarily from Pueblo Bonito where the evidence is that they were kept alive in cages (Pepper 1920:194-195, Judd 1954:264). With the exception of the parrot, these birds are native to areas south of southern Sonora, providing again direct evidence of trade with Mexico.

C. Environmental Data

Evidence from Chaco Canyon, derived from both recent and prior multidisciplinary research there, indicates that the climate during the Anasazi occupation did not differ much from that of today. Slightly drier conditions may have prevailed but even then the stream probably ran intermittently in an entrenched channel. General aggradation during the period was interrupted by several cycles of cutting which may have prevented valley floor flooding, although the water table fluctuated considerably. A positive filling episode was initiated around 1100 AD, and continued until the old channel was buried. Modern cutting began in the mid-1800's. Soil studies suggest that soils derived from the headwaters of the Chaco are very highly alkaline and might have been generally unsuitable for farming (D. Love, personal communication).

Vegetatively, there was probably more pinyon cover than today, but there is little evidence for the presence of ponderosa forest nearby (Hall 1975). Some Douglas Fir may have been present in north-facing rincons, fed by seeps or springs. When sparse local resources were depleted, ponderosa and Douglas Fir would have to have been brought in from sources as distant as 25-35 kilometers. A more complete, documented summary of the Chacoan paleoenvironment can be found in Judge (1977).

II. DERIVATION OF AN EXPLANATORY MODEL

A. Statement of the Problem

It is apparent that developments in Chaco from 900-1200 AD were probably unique to the prehistoric Southwest. Important questions raised by the "Chacoan phenomenon" are: 1) What kind of system of human interaction was taking place in Chaco? Was it basically religious, economic, socio-political, or some combination of these? Was a stratified society, virtually unknown in the egalitarian Southwest, involved? 2) How, and more importantly, why, did the phenomenon develop? Was it the outgrowth of an evolutionary sequence indigenous to the Chaco Basin, or was it imposed upon indigens by peoples from elsewhere and if so, from where? Why did development take place in Chaco, generally devoid of natural resources? 3) What were the population parameters during the Bonito Phase? Did the population really double in the 11th century, as indicated by the room count, or was the area occupied on a less than permanent basis? 4) Finally, what caused the collapse of the system and the abandonment of Chaco Canyon, and how was this related to the physical, natural, and social environment?

These are the kinds of questions brought to mind by the events which took place in Chaco. If at this time a basic, general model can be derived which offers reasonable explanations for some or all of these questions, then refinement and testing can be approached later.

B. A Suggested Cultural Model

The following reconstruction is offered here as a trial formulation of events describing the Chacoan phenomenon. Based on ceramic evidence, movement of people and/or goods in the Chaco Basin was commonplace as early as Basketmaker/Pueblo-I times. Exchange was based on reciprocity among kinsmen in different areas of the Basin. Fundamental ties between outlying areas and Chaco Canyon were established, and reciprocal exchange served to help equalize differential access to resources as well as inequities in resource productivity (c.f. Bronitsky 1976, Schelberg 1976). Rainfall was not only sparse, but quite variable from place to place within the region.

By the first part of the 10th century, reciprocal exchange routes became more formalized, involving the movement of goods between sites and/or resource areas, instead of between kinsmen. The system at this time could be more appropriately termed an incipient redistributive network. Some storage of trade items probably took place in Chaco, which was centrally located within the region. Actual redistribution of goods may have taken place seasonally, as the majority of the perishable items became available. Craft specialization in the processing of turquoise began to develop at this time. The storage and exchange of goods could have been both stimulated and regulated by the use of turquoise, a highly valued commodity. Control over the production of turquoise, and thus the management of the redistributive system, was in the hands of the specialists.

During the 11th century, the redistributive network became highly formalized with Chaco Canyon as the economic, administrative, and possibly ceremonial center. Full-time administrative specialists as well as other craft specialists (e.g., turquoise processing, stone masonry) were being supported by the system. Control over the resource base was attained by Chaco in some, though perhaps not all, outlying areas in the form of satellite centers such as Kin Ya'a, Pueblo

Pintado, and Aztec. Prior trade routes became highly formalized as a roadway system, supplemented by a complex visual communication network. Storage facilities in Chaco Canyon existed in the form of the large rooms in the Bonito Phase sites. Possibly, these sites were end points on roads into Chaco from various outlying areas, thus controlling resource acquisition from these areas. Formal redistributive events, during which people from outlying areas would aggregate in Chaco Canyon, were scheduled by the administrative specialists on a regular basis. Actual exchange within the Canyon probably took place at a central locus, such as Pueblo Bonito or Chetro Ketl, after goods had been stockpiled at the other canyon sites.

Except for scheduled aggregations during redistributive events, the population in the Canyon was not necessarily large. Small caretaker groups could have maintained the sites, and these in addition to the craft and administrative specialists would have accounted for the permanent population. The permanent population in Chaco would have been supported largely by the redistributive system as a whole and thus would have been relatively free of local environmental constraints.

It will be noted that this particular model assumes the Bonito Phase is an outgrowth of a sequence of events which took place within the Chaco Basin. Before considering the alternative, i.e., a system imposed on the Chacoan population from the outside by a presumably more advanced people, it seems reasonable to examine the implications of this model in more detail. If it cannot be supported, then alternatives should be considered. The remainder of this paper will deal with an examination of a possible ecological basis for the model.

C. A Suggested Ecological Basis for the Model

In searching for an explanatory basis for the processes outlined above, it is appropriate to view the Chaco Basin analytically as an ecosystem in which man, as a

cultural species, was an integral part. The same basic ecological principles apply equally in this case as in other ecosystems, i.e., principles of energy distribution, diversity, trophic levels, succession, stability, etc. The only difference would be that change involving the human element would take place more rapidly since cultural, rather than genetic, adaptations would be involved.

Viewing this ecosystem during Basketmaker times, man is seen occupying a very generalized subsistence strategy, based primarily on horticulture and gathering. In a sense he was fundamentally a primary consumer, quite directly dependent on the environment for survival. Whereas other primary consumers (e.g., herbivores) depend on mobility to compensate for environmentally induced variations in net productivity, such compensations by sedentary humans would have taken the form of increased dependence on storage facilities and wild food sources, and reciprocal exchange with areas of higher productivity. This view of man's role fits very well Odum's definition of ecological niche as "the position or status of an organism within its community and ecosystem resulting from the organism's structural adaptations, physiological responses, and specific behavior (inherited or learned)" (1959).

The total energy available for human consumption would be a function of the net productivity of the ecosystem, and thus would be limited by the physical environment. In the Chaco Basin, productivity would be almost directly related to available moisture in the form of rainfall. The rather delicate balance of this system could have been disturbed by environmental deterioration during the 9th century. Further aggrevation would have resulted from the possibility that the human ecological niche may have been saturated with individuals at that time.

Several responses to this situation could be anticipated, such as migration from the ecosystem, alteration of niche breadth, etc. However, another alternative could be that of adaptation to a higher trophic level, which is one method

of increasing the efficiency of resource utilization (Pianka 1974:144). Community diversity is enhanced by such trophic differences, and some hold that stability is also increased (MacArthur 1955).

It is therefore suggested that niche differentiation took place within the human component of the ecosystem sometime early in the 10th century. The new trophic niche was occupied by only a small segment of the population--the full-time specialists--that had advanced to a level where subsistence was derived primarily from the energy produced by others. These specialists can be viewed analytically as secondary consumers in the sense of ecosystem energetics. They would have achieved an independence from environmental constraints not enjoyed by the primary consumers at a lower trophic level.

Such ecological advances could have taken place within the human component of an ecosystem only as long as certain preconditions were met. For instance, in an arid and unstable environment, it is unlikely that a single human community could support full-time specialists. Therefore an exchange network would have to have existed which would permit such support to be drawn from multiple sources within the ecosystem. Furthermore, during conditions of environmental deterioration, the alternative of migration from the ecosystem must have been unattractive, e.g., saturation conditions must have existed elsewhere as well. Finally, only a small portion of the population could make a trophic shift of this nature, due to the 80-90% energy reduction that occurs between trophic levels of a biotic community.

Given the satisfaction of the prerequisites, one might suggest that such a shift by a segment of the human component would, through efficiently managing the redistribution of resources, serve to increase niche breadth of the human component of the ecosystem as a whole. The net effect would be an increase in the stability of primary production, as well as a resultant increase in community

stability. Such stability would be very valuable in a marginal environment such as that of the Chaco Basin. In Margalef's (1963) terms, the ecosystem would have matured, and succession would have taken place.

If the shift to a redistributive system supporting various specialists has a valid ecological basis, are there ecological reasons for the collapse of the system as well? It might be suggested that the new trophic niche would become quickly saturated with individuals, taxing the amount of energy the environment could provide. Given this degree of saturation, even limited environmental deterioration would result in a reduction of productivity and insufficient energy to support secondary consumers. Since the redistributive system could not function without specialists to maintain it, collapse would have come quickly. It is interesting to point out that while environmental deterioration at the center of the region could have initiated the shift to the formal redistributive system, it could have been environmental deterioration in the peripheral resource areas which brought about its demise.

Finally, one might ask what advantages are accrued by suggesting an ecological basis for the cultural model of redistribution in the Chaco Basin? As Pinaka has pointed out, the concept of niche can be defined as "the sum total of the adaptations of an organismic unit" (1974:190). As such, there is an intimate relationship between niche, adaptive radiation, and evolution, and the cultural model thereby acquires a much more powerful explanatory basis than it had before. This holds true for explaining the origin as well as the demise of the system modeled.

Further, the application of ecological principles of energetics and energy flow opens up a wide variety of analytic possibilities unavailable otherwise. For example, knowing the general reduction in energy available to successive trophic levels in an ecosystem, it might be possible to estimate the net annual production of the Chaco Basin and then estimate the maximum number of full-time specialists

the system could support. Such an endeavor would give us a much different perspective on understanding the Chacoan phenomenon and assessing the validity of explanations for it. It is felt that these as well as other advantages provide a more adequate basis for pursuing the development, refinement and testing of this model in more detail.

III. CONCLUSIONS

I would like to summarize briefly by emphasizing several key points which are fundamental to the evolutionary model proposed above. First, it must be demonstrated that there existed positive selective advantages to the evolution of a system of redistributive exchange as postulated here. Second, it is assumed that the redistributive system requires the services of full-time specialists in order to operate effectively. Third, it was suggested that several preconditions be met in order for the system to become operational in an arid environment. And finally, it is recognized that the system has very definite environmental limitations, i.e., given the specific level of human technology represented, the longevity of the adaptation may be directly related to the stability of the environment. In a more stable environment, the system could, and in the case of temperate zones probably did, endure and continue to evolve.

Contrast this evolutionary model with the alternative, i.e., that the system was imposed on the inhabitants of the Chaco Basin by outsiders (Mexican Pochteca?). It would seem to me that some form of redistributive system similar to that postulated here would still be required to explain the Bonito Phase developments. The difference would lie in the nature of the stimulus needed to acquire it. Further, there would still be environmental limitations on the ecosystem as a whole, thus an ecological approach remains most appropriate for understanding the basic energetics of the system, including the number of specialists (Pochteca or otherwise) it could support.

The fundamental question for those interested in understanding processes of human behavior is in what way is the origin of the Chacoan phenomenon related to its demise? If imposed from the outside initially, then did the collapse occur because the parent system failed elsewhere, or on the other hand, is the environment of the Chaco Basin ultimately responsible for arresting the development, regardless of the nature of the origin? I admit it would be easier at this point to blame the Chaco failure on somebody else; the Toltec collapse, for instance. However, I feel we owe it to ourselves as scientists to define and investigate alternatives in the hope that a fuller understanding can be achieved.

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