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Breaking the mold: Integrating participatory environmental assessments and underlying narratives to expose differences in traditional stakeholder categories

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ABSTRACT

Evaluation that integrates different stakeholders' assessments of past land management actions is important to improving restoration science and practice. This integration process is often perceived as challenging because stakeholder categories are expected to have different values and assessments. This study explores these assessment differences by comparing land management ratings and underlying narratives among three traditional stakeholder categories: researchers, practitioners and land users. Stakeholders were interviewed during a participatory evaluation of past land management actions in the San Simon watershed in Arizona. Results showed that historical, cultural and science-based narratives explained some assessments, while others were in conflict. Neither assessments nor narratives were necessarily aligned with stakeholder categories. Moreover, new typologies of stakeholder categories emerged from the analysis: optimist, pessimists, pro-management and conflicted. Using common narratives to identify stakeholder typology instead of categorizing them based on traditional labels could give more information and facilitate the integration of stakeholders in environmental assessment and management.

1. Introduction

Land degradation—or the persistent reduction of land productivity (Safriel et al., 2005)—has been and remains a major challenge in drylands. For centuries, humans have attempted to maintain, recover or increase the productivity of drylands through a combination of soil, water, vegetation and livestock management actions. Examples of these land restoration management programs (land management hereafter) that were implemented over 50 years ago include the *Pinus halepensis* forestations in the Mediterranean in the first decade of the 1900s (Bautista et al., 2010) and the *Eragrostis lehmnanniana* seeding in southwestern U.S. in the 1940s (Allen, 1995). Assessment of these older land management projects is essential to improving restoration science and current land management methods. Unfortunately, efforts to assess the impact of past land management programs over the long term have been limited (Bautista et al., 2009).

Another valuable but uncommon practice in the assessment of past land management projects is the integration of different stakeholders' knowledge and experiences (Bautista and Orr, 2011; Whitfield and Reed, 2012). Restoration literature mentions that successfully restoring and managing landscapes involves not only science but also the values and perceptions people have about their local environments, including the original components, features, and/or functions they perceive their environments should provide (Robertson et al., 2000; Clewell and Rieger 1996; Moreira et al., 2006). However, identifying these qualities in landscapes that have undergone decades or centuries of human use and disturbance is often arbitrary and complicated (Farina, 1998; Jackson and Hobbs, 2009). For example, in the southwestern U.S., due to the limited historical documentation of pre-European ecological conditions and the open range cattle boom of the 1890's, common portrayals of pre-disturbance conditions come from traveler

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descriptions, hagiographic biographies, cowboy tales, etc. that were written at the turn of the 20th century (Sayre, 2006). In such contexts, a combination of local and scientific knowledge is not only important, but crucial to understanding the project under assessment. Furthermore, understanding how through centuries humans have transformed the environment into landscapes for their use is important to comprehend the existence of different local views and contextualize dynamic changes observed in our managed ecosystems (Balée, 1998; Swetnam et al., 1999).

Nevertheless, the participation of stakeholders is perceived as a challenge, in part due to defined differences between local and scientific knowledge (Berkes et al., 2006; Robinson and Wallington, 2012). Local knowledge is understood to be based on firsthand evidence, common sense, casual empiricism, life experience, intuition and oral storytelling (Corburn, 2003). Expert or scientific knowledge is generally reductionist, based on quantitative data, generalizable rules (Failing et al., 2007) and can be replicated and validated through a process of academic peer review of recognized experts (Zermoglio et al., 2005). Uncertainties about local knowledge and its potential integration with expert or scientific knowledge are also perceived as challenges in restoration science and are likely reasons for not having included more diverse types of stakeholders in the implementation and assessment of land restoration and management. The ideal situation is having scientists generating and refining crucial ecological knowledge and the users of ecological restoration (practitioners, land managers, land users) putting that science into practice, exchange insights with the scientists, to test and improve theories (Cabin et al., 2010). Nonetheless, in the practice these producers and users of science are not only are not working together mainly due to misunderstanding of each other's perspectives, lack of communication and lack of value of the importance of one another (Clewell and Rieger, 1997; Cabin, 2011).

Information on the perceptions of degradation and the cultural value held by local people can be captured by the study of environmental narratives (Popper and Popper, 1996; Farina, 1998; Moreira et al., 2006). Environmental narratives are a combination of observations, stories, knowledge and experience people share about both the biophysical and cultural context of a region (Hinchman and Hinchman, 1997). Narratives in the social sciences represent the basic way we humans select, organize and connect events that we later use to communicate, explain preferences, make sense of the world around us and sometimes even change it (Riessman, 2003; Ingram, 2014). The study of narratives has been used in environmental management to understand how problems are understood by different stakeholders and how this may affect management strategies and generate conflicts (e.g. Robbins et al., 2007; Harris, 2009; Bixler, 2013).

The objective of this study is to explore the perceived challenge of integrating different stakeholders in land management assessments by identifying the existence of commonalities among stakeholders from three traditional stakeholder categories (researchers, practitioners and land users). This was done by exploring the relationship between the assessments and the types of narratives provided by members of each category. In the context of this research, assessments are the specific numerical ratings provided by stakeholders while narratives are defined as descriptions based on beliefs, values, perceptions, personal experience (including academic experience), observations and/or oral history used to justify or explain a preference for a specific land management practice. Based on the difference between scientific and local knowledge, there is a general assumption that stakeholders from these predefined categories may have commonalities in both how they perceive the landscape and the types of narratives they use to justify their preferences and asses past land management. Because narratives are not only connected to values and perceptions but also to experience and observation, it would be expected that stakeholders with local knowledge will make more frequent use of locally relevant historic chronicles and culturally shared experiences. In contrast, stakeholders with scientific or academic backgrounds may be more inclined to use other types of narratives or justifications based on scientific documentation and data.

These assessments and narratives were contributed by stakeholders during a participatory evaluation of past land management in the San Simon watershed in Arizona (U.S.) in 2013. Commonalities between members of the same stakeholder category were determined by: 1) comparing the land management assessments (ratings) within and across stakeholder categories; 2) identifying the common narratives used by the different stakeholders; and 3) examining the relationship between stakeholder category, their narratives and their land management assessments. Exploring these assessments and what underlies them helps us understand what stakeholders have in common, on which topics they diverge, and whether new typologies that go beyond traditional stakeholder categories might emerge.

2. Methods

2.1. Study area

The San Simon valley is located in southeastern Arizona and southwestern New Mexico, approximately 50 km from the U.S.–Mexico border (Fig. 1). The valley is marked by the north-flowing San Simon River, which is a major ephemeral tributary of the Gila River that provides irrigation water for an important farming area in Arizona. The San Simon watershed is large (5827 km^2) and complex in terms of land tenure and vegetation communities. Approximately 41% of the watershed is managed by the U.S. Bureau of Land Management (BLM), while the rest is comprised of State Trust land (26%), private land (19%) and U.S. Forest Service land (13%). The calcareous loam and clay loam soils found in the watershed are of alluvium origin and are prone to down-cutting and arroyo formation—the conversion of broad valley floors into continuously entrenched stream channels (Bull, 1996; Cook and Reeves, 1976). This study focuses on the northern half of the watershed, which encompasses areas of Chihuahuan–Sonoran Desert shrublands (elevation 800–1200 m; mean annual precipitation 200–300 mm) and Chihuahuan–Sonoran Semidesert grasslands (elevation 975–1525 m; mean annual precipitation 300–400 mm) (USDA & WRRC, 2007).

The history of land use and environmental change in the San Simon watershed is common to many similar landscapes in the Southwestern U.S. Historical descriptions suggest that prior to European settlement, the watershed contained a perennial river and was dominated by grasslands, meadows, marshes and perennial grasses, which were heavily grazed in the 1890s (e.g., Barnes, 1936; Williamson, 1939). Other descriptions from the same period do not account for expansive grasslands or the presence of perennial water and willows in the San Simon River (Emory, 1857: 67; Hodge, 1962). With such scant and often contradicting historical descriptions, it is unclear if these grasslands were mythical, real or observations that were limited to a specific location or time, such as after a large rainfall event. What can be confirmed is that the existence of favorable soil and vegetation conditions attracted settlers, stockmen and farmers in the 1880s who transformed the valley into a production-based landscape (Jordan and Maynard, 1970) that was supported by railroad construction and the channelization of the San Simon River to protect farmland from flooding (Williamson, 1939).

At the turn of the century, a combination of climatic events and anthropogenic factors resulted in a decrease of grasslands, invasion

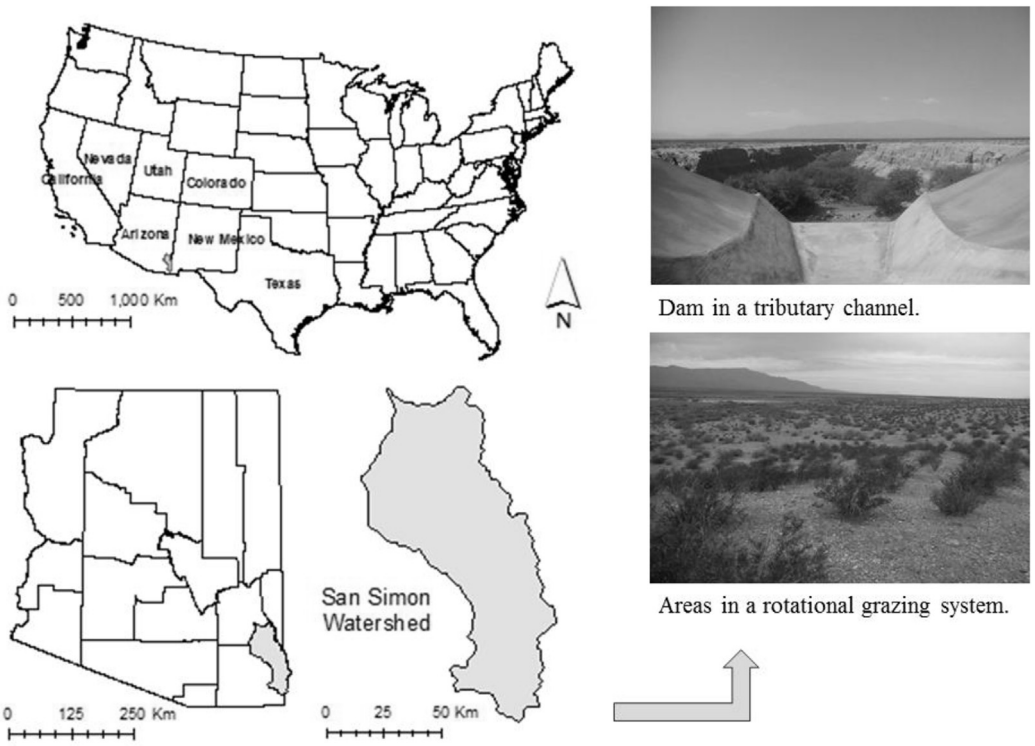

Fig. 1. San Simon watershed location and main land management actions.

of shrubs (shrub encroachment), severe soil erosion and widening of the San Simon channel (arroyo-cutting). By 1919, observations suggest that the San Simon had transformed into a highly eroded watershed draining sediments into the Gila River and was recognized by the U.S. Senate as requiring the implementation of extensive and immediate restoration measures (Olmstead, 1919). In 1934, the U.S. Grazing Service (followed later by the BLM), initiated five decades of land management on the San Simon River and tributaries to manage erosion, shrub encroachment and flood risk. The most important of the land management techniques included: i) hydraulic structures along the main channel and smaller structures in the upland tributaries; ii) grazing management restrictions (572 km^2 of rangeland under some type of rotational grazing regime and 198 km^2 rested from grazing for over two decades); iii) shrub (*Prosopis glandulosa* and *Prosopis velutina* (mesquite) and *Larrea tridentata* (creosote bush)) removal through prescribed burns, herbicide application and mechanical removal; and iv) reseeding with different non-native perennial warm-season grasses such as *Eragrostis lehmanniana* (Lehmann's lovegrass), *Panicum andtidotale* (blue panic grass) and *Cynodon dactilon* (bermuda grass).

2.2. Land management context and stakeholders

The diverse past land management strategies in the San Simon valley were grouped into five actions (Table 1). Most land in the watershed has undergone a combination of these actions.

This study included the formation of a multi-stakeholder platform (MSP) (*sensu* Steins and Edwards, 1999) consisting of different stakeholders facing the same resource management problem. To ensure comprehensive and balanced representation across interests, the MSP was identified using chain referral, a purposive sampling method in which participants are asked to refer other potential stakeholders to participate until the referrals became duplicative (Bernard, 2006). A first group of participants was directly selected by the team due to its involvement in the project. This initial group was formed by two key members of a local watershed group called the Gila Watershed Partnership, one representative of the regional U.S. federal land management agency in charge of managing the largest portion of the watershed (BLM Safford Field Office), and two researchers with extensive experience in this watershed. This group initiated the chain referral method by referring other potential stakeholders. The increasing list was continuously reviewed to make sure it only included stakeholders located within the area of study with direct knowledge on the San Simon or directly affected by the land management actions in the watershed. For this reason, we did not consider the suggestion of persons with local or scientific knowledge and experience from other watersheds with different historical and climatic conditions.

The list of stakeholders was grouped into three categories that are often used in restoration ecology, each associated with a different type of knowledge: i) Practitioners, or those with on-the-ground experience applying the land management actions such as governmental agency experts and natural resource managers from non-governmental organizations; ii) Researchers from universities that have studied or worked in natural resource management and ecological restoration; and iii) Land users in the watershed, such as farmers, cattle ranchers, owners of ranchettes and hunters. The composition of the MSP ($n = 33$) was 27% researchers, 27% land users and 45% practitioners (39% of whom were governmental agency experts and 6% of whom were from environmental associations). There was no overlap between the different stakeholder categories, although the work of some researchers included an on-the-ground component. In these cases, we clarified to the participant the role for which they were contacted and interviewed.

Table 1
Land management and restoration actions in the San Simon watershed.

Action abbreviation	Description
ROT_GZ	Only rotational grazing was applied as a land management.
ROT_GZ_VG	Rotational grazing combined with all or some vegetation management techniques, such as plowing, shrub control (i.e., mechanical removal, burning, and herbicide application) and reseeding of grasses, including *Eragrostis lehmanniana*.
REST_GZ	Long-term resting from grazing, or livestock was intentionally removed for at least 10 years.
REST_GZ_VG	Long-term resting from grazing and vegetation management methods to control shrubs and reintroduce grasses.
STRUC	Hydraulic structures such as dams and dikes. This can be further divided into large engineered structures across the main channel, medium sized structures on the tributaries and smaller earth dikes in the uplands.

2.3. Stakeholder assessment of past land management

The approach for the participatory evaluation that served as the basis for this research is known as the PRACTICE Integrated Assessment Protocol (IAPro) (Bautista and Orr, 2011). This approach was developed and tested in eleven countries prior to being implemented in the San Simon watershed (Rojo et al., 2012). IAPro consists of seven steps that aim at promoting knowledge exchange and social learning, while integrating expert and local knowledge as well as biophysical and socio-economic information in a participatory evaluation. This research is primarily based on the information collected during steps 1 (stakeholders identification and engagement) and 2 (baseline evaluation of actions and selection of site-specific indicators) of IAPro.

A semi-structured interview developed for IAPro (Bautista and Orr, 2011) and guided by a list of questions about the watershed and past land management programs was conducted with each stakeholder ($n = 33$). This is a common qualitative method that has the open-endedness of an unstructured interview, but is guided by a list of key topics or questions (Denzin and Lincoln, 2011). Preceding each interview, a description of the research project and the nature of participation was shared as part of the participant's informed consent process.[1] In these 90-min interviews, each stakeholder was asked about his/her: i) opinions on the watershed and its social-environmental conditions; ii) self-assessed knowledge on each land management practice; iii) understanding or knowledge of the original objective of each land management practice; iv) general opinion in terms of the usefulness of each land management practice to achieve the believed intended objectives, v) positive and negative effects of each land management practice; vi) recommendations for future implementation; vii) assessment of each land management practice individually on a Likert-scale, with 1 being a very bad choice and 5 being an excellent choice and viii) overall ranking of all the land management collectively considering their perceived usefulness.

2.4. Identification and comparison of narratives and land management assessments

To capture stakeholders' justifications for their evaluations of land management practices, detailed field notes were taken during the semi-structured interviews. Content analysis of the field notes was conducted to make inferences in value-laden and subjective textual information by systematically identifying and organizing key structures (Neuendorf, 2002; Ryan and Bernard, 2003; Franzosi, 2004). Core and latent themes (groups of words with similar meanings and connotations) were identified inductively using an emergent and iterative post-coding process that involved identifying, cutting and sorting similar comments, descriptions and explanations. These themes formed the foundation for the *narratives* captured through this content analysis. Similar narratives were grouped and categorized as the same *narrative type* based on the probable source of the information: historical (story-based), cultural (or value-based) and science-based. For example, when discussing rotational grazing management, it was very common to hear historical narratives as comments related to the perceived history of the watershed. The final list of narrative types was later coded according to the three possible *narrative use* types expressed by each stakeholder (Table 2).

Descriptive statistics were performed on the themes coded as narrative uses. Then, Multiple Correspondence Analysis (MCA) was performed with STATA 11.1 (StataCorp, College Station, Texas, USA) to explore the relationship between the narrative use and the three pre-defined stakeholder categories. MCA is an exploratory technique used to detect association between variables and groups of individuals in a cross-tabulation of categorical data (Greenacre, 2004). The association is commonly represented in a two-dimensional map based on the similarities and differences in variables between groups of individuals represented geometrically with two axes or dimensions that measure the main components by interpreting eigenvalues and variance rates. Points are represented in the map based on the set or relative frequencies of each variable studied. Similar cases are grouped closer together based on the chi-square distance and weighted proportionally to the sample size. The center of the map represents the average response pattern or the inertia of the dispersion of the cloud of points. Proximity between points represents similarity in the rows and columns' frequencies, in this case narratives and stakeholder categories, respectively.

The results of the ratings or individual land management assessment (point vii of the IAPro) were evaluated for similarity within each of the three pre-defined stakeholder categories through the Kendall's W coefficient of concordance (Siegel and John Castellan, 1988) in SPSS 15.0 (SPSS Inc., Chicago, USA). Kendall's W is a measure of agreement among m judges (in this case stakeholders) evaluating a set of n objects (in this case land management actions). A value of 1 signifies a total agreement in the rankings provided by different stakeholder categories, and 0 means that there is a lack of agreement compared to a random distribution of ranks (Legendre, 2005). The null hypothesis says there is independence of the rankings provided by the judges. This non-parametric method is used when the data set is small, the dependent variable is on an ordinal scale and there are more than two levels in the explanatory variable. Results were tested at a 5% level

Table 2
Narrative uses: how each stakeholder employed (or not) each narrative theme.

Narrative use code	Narrative use description
NO	Does not mention the narrative
YES	Mentions the narrative and believes/supports it
NEG	Mentions the narrative but does not believe/support it

[1] This research was reviewed and approved by the Institutional Review Board for the Protection of Human Subjects (IRB project number: project number 13-0297; FWA number: FWA00004218).

of significance. When $n \leq 7$ and $m \geq 20$, results are significant if the obtained Kendall's W is larger than the computed W from a table of critical values (Siegel and John Castellan, 1988).

Finally, we examined the coded content in four mentioned narratives that consistently showed contradiction and conflict—S_past, S_grass, Adapt_mgm and S_graze—and compared the content with the stakeholders' assessments or ratings of the five land management actions. We expected these narratives to be logically connected in a way that justified the stakeholders' ratings. For example, it would be expected that non-believers of the existence or possibility of having grasslands in the San Simon valley (S_past and S_grass) would be more inclined to be against actions that attempt to recover grasslands. On the other hand, those who believe in the restoration potential of the watershed (Adapt_mgm) would be expected to favorably assess active land management instead of resting options. For those stakeholders who made use of these four narratives, we examined the logic and connection between the narratives and the rating to determine consistency, or on the contrary, define more representative stakeholder typologies.

3. Results and discussion

3.1. Narratives and stakeholders categories

Post-coding content analysis of field notes from the semi-structured interview resulted in the identification of seven narratives. These narratives were organized into three *narrative types*: historical narratives, cultural narratives and science-based narratives (Table 3).

The view that the watershed is currently degraded based on a belief that its original condition was grassland-dominated was an important theme categorized as the historical narrative type. This theme was mentioned by 57% of the interviewed stakeholders. These stakeholders spontaneously used the pre-settlement or original landscape descriptions when describing their opinions of the San Simon watershed and its social-environmental conditions or when discussing the importance of the management actions to increase grass productivity. However 53% of those who mentioned these historic descriptions showed little or no belief that the "lush tall grasslands" of past accounts actually existed (the narrative use 'S_pastNEG'); they believed the grasslands were less of a historical fact and more of a "romantic" depiction. Indeed, the stakeholders that use this narrative negatively use it to explain that the descriptions of historical grasslands may have been true only for some small areas—e.g., a prevalence of *Sporobolus wrightti* (sacaton grass) in the bottom lands near the main river channel—and only during short periods of times.

In the cultural narrative type, 34% of stakeholders mentioned the positive effects of grazing as a land management method and that grazing was "a legitimate use of public lands" and was "providing more than economic benefits". By contrast, 16% of the stakeholders described that grazing leads to "unrealistic expectations" and is "a waste of money". The remaining stakeholders (50%) did not mention anything specific about the cultural aspects of grazing, but focused instead on the grazing management techniques applied in support of the restoration of the watershed.

In the science-based narrative type, 66% of the stakeholders mentioned "data limitations", "lack of monitoring" and " lack of scientific evaluation" to implement a successful "adaptive and active management". They further explained that such data, monitoring and evaluation are needed to properly assess past land management in the San Simon watershed. Statements such as, "we do not have the data to know what we are doing" or "you cannot judge because there is not enough data" were used by individuals from all three stakeholder categories. With respect to other science-based narratives, 30% percent of the stakeholders mentioned the dry climate ('S_climateYES') as a key factor impeding the ability to properly evaluate the actual impacts of the actions. On the context-specific ('SpecificYES') narrative use, 49% of stakeholders pointed out that all five land management actions were useful, since each option must be considered based on site-specific conditions, including rainfall, soil, vegetation type and land management history. As expressed in the statements of land users interviewed, "each action has its merit" and "is not one-size fits all" but a combination of "a little bit of everything" because "what works one year does not work next year or does not work ten miles away".

The exploration of these narratives showed that more practitioners and land users mentioned the specificity of each action to local conditions (narrative use 'SpecificYES') as a key factor for the success or failure of some land management actions. More researchers (62.5%) mentioned the importance of management ('Adap_mgmYES') and more practitioners (43.8%) used the negative narrative with respect to the veracity or comprehensive application of the historical narratives (narrative use 'S_pastNEG'). Table 4 shows the percentage of stakeholders from each category who mentioned a certain narrative, but does not display a pattern that could be attributed to the traditional stakeholder categories.

The MCA results indicate that there is neither a significant pattern nor consistency among the practitioners, land users or researchers in their use of narratives based on the proximity of the points to the stakeholder category (Fig. 2). The MCA map showed that researchers employed conflicting narratives, illustrated by a more dispersed pattern of points related with the narrative uses.

Table 3
Narratives and associated narrative types identified in the San Simon watershed participatory evaluation.

Narrative code	Narrative description	Narrative type
S_past	A description of what the stakeholders believe the San Simon valley was like before the cattle boom or European settlement.	Historical
S_graze	Values placed on the land uses; mainly discussion about the recovery of grasslands for ranching or biodiversity conservation.	Cultural
Specific	Responses that directly or indirectly mention that due to the complexity of this landscape, actions should be assessed based on the specific ecological conditions.	Science-based
S_climate	A perceived a change or reduction in precipitation; this perception was used as an explanation for why the land management is working or is not working.	
Data	Any reference to a lack of scientific information and monitoring data for good management of the San Simon valley.	
Adap_mgm	Advocacy for active management and monitoring in order to adapt methods to the current and future conditions based on documented trends.	
S_grass	Possibility of maintaining or restoring grasslands in the San Simon valley. Related to the presence or absence of the necessary conditions (mainly precipitation) to maintain or recover grasslands.	

Table 4
Percentage of stakeholders in each traditional category and narrative use during the participatory evaluation.

Narrative use	Traditional stakeholder categories		
	Researcher	Practitioner	Land user
S_climateYES	38	19	44
S_climateNO	63	81	56
S_climateNEG	0	0	0
SpecificYES	25	69	56
SpecificNO	75	31	44
SpecificNEG	0	0	0
Adap_mgmYES	63	43	11
Adap_mgmNO	38	56	89
Adap_mgmNEG	0	0	0
DataYES	13	50	11
DataNO	88	50	89
DataNEG	0	0	0
S_pastYES	13	31	33
S_pastNO	75	25	44
S_pastNEG	13	44	22
S_grazeYES	25	38	33
S_grazeNO	75	38	56
S_grazeNEG	0	25	11
S_grassYES	0	0	0
S_grassNO	75	56	78
S_grassNEG	25	44	22

YES = mention the narrative and believes/supports it; NEG = mentions the narrative but does not believe it (mentions it in a negative way); NO = did not mention the narrative.

The map showed that more individuals from the practitioner category used narratives about the specificity of land management actions; these individuals were also more negative about the historical narratives (47% of them mentioned that do not believe in the historic grasslands concept). Land users were less inclined than the two other stakeholder categories to raise the science-based narrative type as indicated by the shorter distance between land users and the points for DataNO, S_grassNO, S_climateNO and Adap_mgmNO. Land users and practitioners were closer in their use of narratives relative to the researchers, as the former two categories were closer to the center of the map. The analysis also showed that the negative use of the grazing narrative (S_grazeNEG) was infrequently used by any of the stakeholder categories (represented in the top right corner of the map).

3.2. Stakeholders, narratives and actions rating

Although all stakeholders had the option to assess the land management actions, 18% did not complete the assessment due to "the many factors playing a role in the results", or because of the belief that "some of the actions were not so much land management but political decisions". Each action was rated on a scale from 1 to 5, with 1 being a very bad choice and 5 being a very good choice (Fig. 3). Erosion control structures, especially the small structures, received the highest rating on average across all stakeholder categories, followed by the combination of rotational grazing and vegetation management (ROT_GZ_VG). Eighty percent of land users rated ROT_GZ in the middle of the scale (a rating of 3). More researchers (60%) rated REST_GZ_VG and STRUC a "4". Practitioners gave a higher rate to the smaller structures (a "4") but had more divided opinions about the rest of actions. REST_GZ received lower average ratings ("1" and "2") across all stakeholder categories.

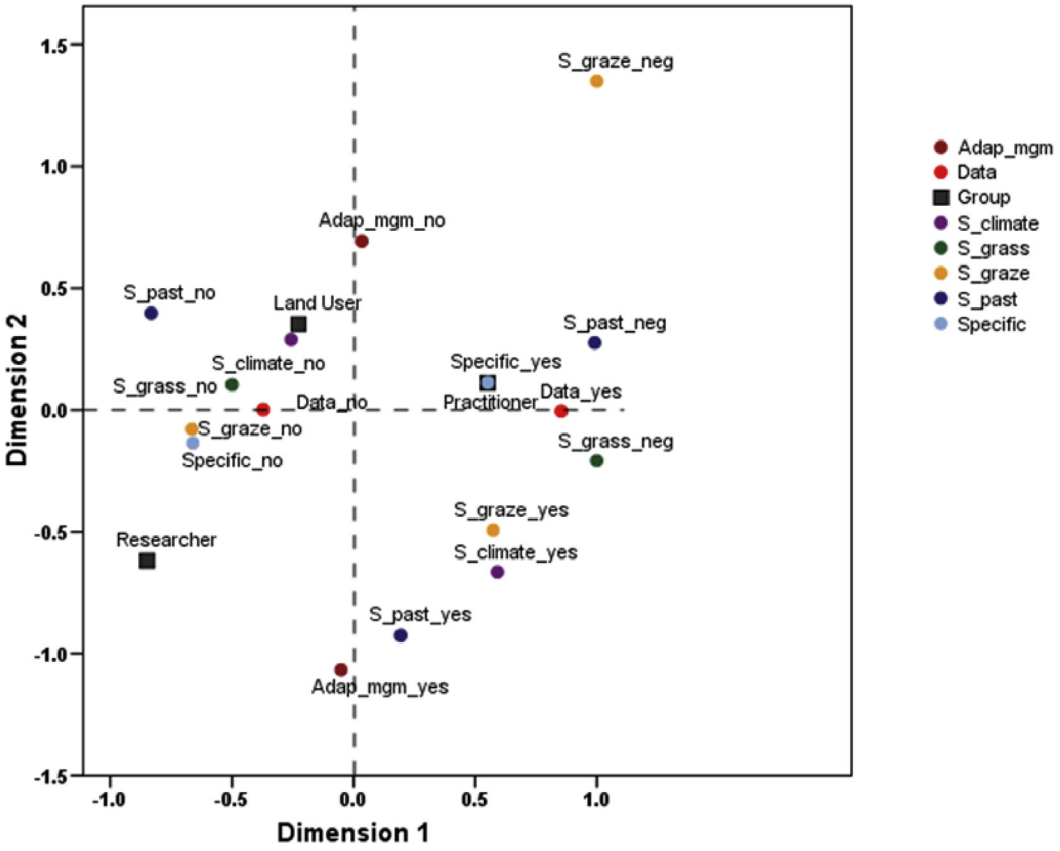

Fig. 2. Multiple correspondence analysis map of stakeholders' use of narratives. Footnote: This is a visual interpretation of the patterns for the stakeholder categories and their use or lack of use of narratives. The center of the map corresponds to the average response. Narratives are reduced to dimensions (y and x axes) and responses are positioned in the map according to their frequencies and closer to the associated stakeholder category that seems to use it more.

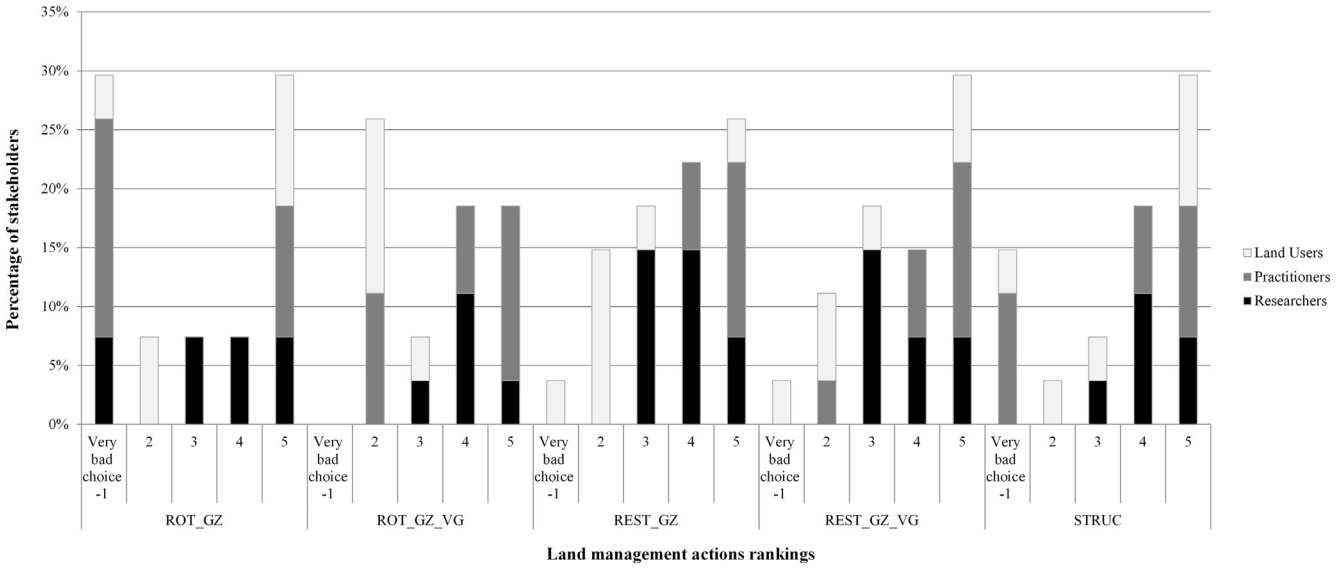

Fig. 3. Individual assessments (ratings) by traditional categories of stakeholder and land management. Footnote: The five actions under evaluation, provided as codes here, are described in detail in Table 1.

However, from these results it was not possible to observe a clear pattern between land management assessments and stakeholder category.

Only the responses of those who ranked all the actions (82% of the participants, 14 practitioners, 5 researchers and 8 land users) were analyzed using the Kendall's W concordance test. The test resulted in small concordance indexes (W) for three of the categories (practitioners = 0.18, researchers = 0.14 and land users = 0.32, where 1.0 would be a total agreement). The significance test for the results indicated that none of the observed W indexes where higher than computed W from the significant table of critical values for significance level $\alpha > 0.05$. This indicates that there is no concordance (null hypothesis) or in this case, no similarity or agreement in the ratings provide by the three stakeholder categories.

3.3. Contradictions in narratives and typologies of respondents

When examining the correspondence between stakeholders' use of the narratives on the grasslands in the past, the possibility to recover these grasses, the possibility of grazing, the need for active management and their land management ratings we found some inconsistencies. For example 60% of those stakeholders that mentioned that grasslands of the past were beyond recovery later contrarily advocated for more intervention, or provided a high rating (4 or 5) to land management with active vegetation management such as ROT_GZ_VG and REST_GZ_VG. Similarly, 50% of those who claimed that the historic grasslands were beyond recovery later stated that grazing was possible in the San Simon valley. Furthermore, half of those who had some doubts about the historic descriptions of the watershed later advocated for a combination of vegetation management and grazing techniques. Other stakeholders who were firm believers of those historic grasslands and the need for their recovery later provided higher ratings to resting grazing and vegetation management (REST_GZ_VG).

Closer examination of the ratings for the stakeholders who sequentially used the narratives S_past, S_grass, Adapt_mgm and S_graze during the interview (24% of stakeholders—3 practitioners, 2 land users and 3 researchers) revealed four typologies representative for these 24% of stakeholders: the "optimist", the "pessimist", the "pro-management (but not for grazing)" and the "conflicted". These typologies were independent and transverse to traditional stakeholder categories and allowed us to explain the contradicting narratives and land management preferences found in some of the interviews. Although it is not possible to extend these typologies to the rest of stakeholders that did not use the four narratives, we believe many of the stakeholders would ascribe to one of them.

The "optimists" are those who believe the watershed was degraded in the past and its recovery would be possible with help of a combination of land management and a careful balancing of multiple uses in the valley (ranching, recreation, wildlife, etc.). The "optimists" were consistent in their evaluations by rating high (3–5) the actions that combine vegetation and grazing management techniques.

The "pessimists" were neither convinced that the watershed was a lush grassland in the past nor that it would be possible to transform the San Simon valley into grassland in the future due to rainfall and temperature conditions. For the "pessimists", vegetation management was evaluated high (3–5) due to its importance for the overall health of the watershed to decrease erosion and increase biodiversity but not for recreating grasslands of the past.

For the "conflicted" stakeholder, the grazing narrative was very important (S_grazeYES), yet these stakeholders sometimes mentioned that the lush grasslands—if they ever existed—would not be possible to recover. They also felt it was important to improve the land for the survival of the ranching economy and associated cultural values. These respondents also assessed with higher ratings combinations of vegetation and grazing management techniques and did the opposite with those actions that required removing grazing, unless it was for a short period of time.

The "pro-management" stakeholder believed that the watershed was once dominated by lush grasslands, but contrary to the "optimist" stakeholder, only advocated recovery for wildlife and landscape health and not for livestock grazing. The same "pro-management" stakeholders tended to give a higher rating to land management actions that required resting of the land from grazing, especially if this resting was permanent. For these stakeholders, wildlife and ranching are two conflicting aspects of the landscape, while for the "pessimist" and the "conflicted", these aspects are

positively interrelated although not necessarily economically feasible today. For the pessimist and the conflicted type of respondents, the underlying grazing narrative and a strong desire for a healthy (non-degraded) watershed were more dominant in their final evaluations than were their doubts about any management capacity to restore lush grasslands that may never have existed.

4. Conclusions

The analysis of narratives along with land management assessments revealed that traditional stakeholder categorizations obfuscate what stakeholders actually might have in common and on what topics their interests may diverge. Embedded in stakeholders' assessments of past land management were narratives on the historic landscape condition, cultural values related to the land, complexity in managing the drylands and convictions about which land management practices are necessary to arrest or prevent land degradation.

It was clear that these underlying narratives influenced stakeholders' assessments beyond their affiliations as researchers, practitioners or land users. Moreover, this approach also helped reveal where and why those narratives and their associated perspectives may seem contradictory to their visions of future directions for the landscape in question. As mentioned by other authors (Carolan, 2006; Oreskes, 2004), values and facts are entangled in the mind of all stakeholders, including scientists, especially when debating ecological problems that may have social, political and even religious importance. This result concurs with Robbins et al., 2007 who found the daily struggle over resources in the local political economy in the Kumbhalgarh Wildlife Sanctuary in Rajasthan India, was what accounted for the differences in viewpoints and not the categorization in state versus local source of the knowledge, which was the generally held view in that context. Similarly as in the different use of the historical and cultural narratives found, other studies have also revealed that although narratives can be shared by many people, the preference of one narrative over another and the way it is used changes from person to person (Bixler, 2013).

Landscapes are places where cultures develop, although the status quo of culture and cultural heritage cannot always be preserved if ecosystems are in dynamic change (Lozny, 2006). Providing an opportunity for stakeholders to not only evaluate land management but also to communicate the narratives behind their views opens up the opportunity to break out of the traditional mold associated with the typical stakeholder categorizations and discuss values related with the past and the future. Exploring stakeholders' direct assessment along with associated narratives offers also the possibility of finding points of convergence and consensus to develop successful future management policies (Harris, 2009; Prell et al., 2009). These findings could help not only with the integration of stakeholders in the environmental assessment of land management practices but also for those involved in planning future land management actions seeking to move beyond stereotypical categories—categories that can lead to entrenched positions on future decisions, such as deciding whether to pursue continual grazing in an area. In a changing environment in which recovering idealized historical conditions may not be possible (Jackson and Hobbs, 2009; Rey Benayas et al., 2009), these processes could provide an opportunity for not only integrated environmental assessment processes, but also decision making for future land management.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.jaridenv.2015.07.007.

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