Twitter as a tool for conservation education and outreach: what scientific conferences can do to promote live-tweeting

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Abstract If more conservation-minded citizens were aware of certain environmental threats and how to resolve them, these issues could be resolved more effectively. Scientific conferences focusing on conservation bring together countless experts on environmental problems and solutions, but are not an effective means of reaching the interested public on a large scale. This paper discusses the use of twitter to share important conservation information from scientific conferences with the interested public. The basic usage of twitter is explained, and strategies to promote live-tweeting of scientific conferences are introduced. A case study (the 2011 International Congress for Conservation Biology) is discussed. If used properly, twitter and other social media technology can be a powerful tool for conservation education and outreach from scientific conferences.

Keywords Conference outreach · Twitter · Social media · Conservation outreach

Introduction

In December of 2011, the Society for Conservation Biology (SCB) held the 25th International Congress for Conservation Biology (ICCB). The more than 1,000 scientists and students from 80 countries who attended the ICCB learned about numerous important conservation issues around the world, as well as what can be done (and is being done) to solve many of these problems.

However, in addition to the critical research that conservation scientists perform, public support is often necessary for substantive government policy changes (Brockington et al. 2006; Ghimire and Pimbert 1997). Many citizens care about the environment, and many problems could be solved if these conservation-minded citizens were informed about specific issues and what they can do to help (Furlong 2004; Golden 1998). If the information presented at ICCB were shared with the public, it could benefit numerous research projects and conservation issues.

Conferences like the ICCB are a great place for conservation professionals to exchange ideas, but they are not ideal for sharing information with the interested public on a large scale. Only a small percentage of the world's conservationists—and an even smaller percentage of the conservation-minded public—can attend.

The basics of twitter

Social media technology can be a big part of the solution to this challenge, and twitter (http://twitter.com) is particularly well suited to sharing information from conferences. The micro-blogging social media software allows users to share easily categorized and searchable information instantly with other users around the world. Key terms associated with twitter are defined in Table 1 and demonstrated in Fig. 1.

Social media software such as twitter makes it easier than ever before in human history for citizens to learn about a topic they care about, and easier than ever before in human history for experts to share their knowledge with the interested public. This technology has numerous applications for conservation education and outreach, including sharing important conservation information with the public on a large scale (Thaler et al. 2012)

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Table 1 Key terminology associated with the use of twitter

Tweet	A message sent on twitter. Each tweet is limited to 140 characters
Follow	To subscribe to another user's tweets
Follower	Another user who has subscribed to a user's tweets. Note: A user is not subscribed to their followers' tweets unless the user also chooses to follow them.
Home screen	A user's home screen displays tweets from everyone they follow in reverse chronological order (with the most recent tweets on top)
Hashtag	Tweets can contain hashtags (#example) which are an internal system of categorization. Users interested in learning about sharks, for example, can search twitter for "#Shark", allowing them to follow discussions on that topic regardless of whether or not they follow the users posting those tweets
Re-Tweet (RT)	To share someone else's tweet. If a user RTs a tweet, their followers will see that tweet regardless of whether or not they also follow the original user who posted it. A re-tweeted tweet includes the name of the user who originally tweeted it.
@Mention	@Mentions allow a user to communicate with another, regardless of whether or not the user they are trying to communicate with follows them. By including @UserName in a tweet, the tweet will be visible to that user
Link	Tweets can include a link to an external website. Because of the 140-character limit, links are automatically shortened to 20 characters.

Numerous conservation scientists and environmental NGOs actively use twitter for public education and outreach, some examples of which are shown in Fig. 1. Twitter is commonly used for sharing news articles and blog posts relevant to the interests of the scientist or NGO, as well as for engaging directly with the public by answering questions and inviting them to participate in conversations with others who share their interests.

Conference live-tweeting

ICCB organizers contacted the author, who uses the twitter account @WhySharksMatter to share information about marine conservation with thousands of followers around the world, and extended an offer to attend the ICCB and live tweet the conference. Conference live-tweeting is simply when twitter users tweet key points from presentations and workshops that they attend at scientific conferences. This allows followers of those users to learn about important issues being discussed at conferences, whether they are attending another session at the same conference or are on the other side of the planet.

With the exception of plenary talks at the largest conferences, most researchers can expect to have their presentation attended by dozens (or sometimes hundreds) of their peers. If the same message is shared on twitter by a user with many followers, that message can reach orders of magnitude more people. Twitter followers often re-tweet conference tweets (greatly increasing the number of users a tweet reaches) and can even ask questions about the presentation being tweeted during that presentation. In many cases, the

Fig. 1 Screenshots from twitter demonstrating the key terms. **A** Sample tweets the author has posted, featuring *1* an @Mention (@DaveBard), *2* a hashtag (#shark), *3* a shortened link, and *4* a tweet the author has re-tweeted, which his followers can see regardless of if they follow @SeaCitizens. **B** Sample tweets from the author's home screen, showing tweets from users the author follows. Each tweet shows *5* a user's real name (or organization name) and *6* a user's twitter username
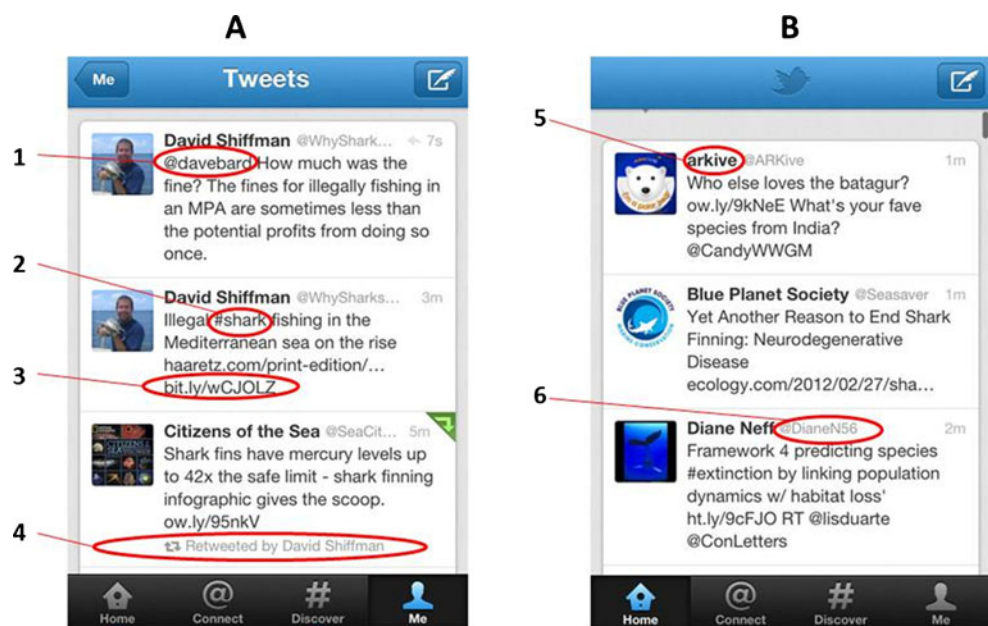
author has been able to relay questions from twitter followers to conference presenters, either during the question and answer session of a presentation or afterwards at a conference social.

In general, it is impossible to transcribe word-for-word what a presenter is saying, and it is impossible to live tweet every talk, particularly in a large conference where multiple concurrent sessions are taking place. Conference live tweeters typically tweet the key points from a talk, which often come from the introduction and discussion. Technical methods and the results from statistical tests are often less relevant to the general public than major conclusions and important general background information.

Conference tweeters must be sure to include the conference hashtag (in this case, #ICCB) in every tweet so that people who do not follow them but are following the conference twitter stream can see their contributions to the discussion. When applicable, tweeters can tweet a link to the scientific journal article that a talk is based on, or a link to the researcher's lab website. Successful conference tweeters always attempt to make each tweet a stand-alone thought so that if it is re-tweeted, it will make sense without having seen the other tweets in the series. Examples of the author's #ICCB conference tweets, and examples of questions the author's followers asked about those tweets, are provided in Fig. 2. Though many people who were already attending conferences tweet about it and some conference have official bloggers and tweeters, to the author's knowledge, this was the first time that a major scientific society engaged someone to attend a conference specifically for live-tweeting.

Live-tweeting at the ICCB

Upwell (Upwell.us), an organization affiliated with the Ocean Foundation that tracks how ocean issues are discussed on social media, analyzed the #ICCB tweets using Radian6 (Radian6.com) social media monitoring software and shared their results with the author. Between November 29th and December 10th of 2011, 1,731 conference-related tweets included the hashtag #ICCB. Some #ICCB tweets, however, referenced "Ireland's Colliery Chesterfield Band," and these were excluded by altering search terms on Radian6 (personal communication, Aaron Muszalski, Upwell).

A total of 176 users from a minimum of 40 countries on six continents (not all users list their home country in their profile) tweeted or RTed at least one conference-related #ICCB tweet (personal communication, Aaron Muszalski, Upwell). Fewer than 10 % of these twitter users were actually attending the conference, demonstrating that live-tweeting inspired, through twitter, a global conversation about the research being discussed at the ICCB.

A plurality of conference-related #ICCB tweets, 708, came from the author (username @WhySharksMatter). The user with the second most conference-related #ICCB tweets contributed 142, and no other user contributed more than 100 (personal communication, Aaron Muszalski, Upwell).

Different twitter software packages code RTs differently, complicating analysis, but the author's #ICCB tweets were re-tweeted a minimum of 532 times. The author also received over 200 questions from followers about #ICCB tweets, though an exact number could not be obtained because these questions did not all include the conference hashtag. Eight of the ten users with the most conference-related #ICCB tweets

Fig. 2 Examples of conference tweeting. A Sample conference tweets from the author's live-tweeting of the 2011 ICCB conference, including 1 the conference's official hashtag (#iccb) and 2 the name of the scientist giving the presentation (the title of the presentation was the first tweet in this sequence, it appears on the bottom of panel (A). B Questions received from followers about the talk the author was live-tweeting. Although the author does not follow all of these users, the use of the @mention (3) made their messages visible to him

were conference attendees, and the remaining two are followers of @WhySharksMatter who asked numerous questions about the conference. The author was able to relay many of these questions to the conference presenters, and was able to tweet the presenter's responses.

At an open-to-the-public panel discussion hosted by the SCB marine section, the author received more than 50 questions from twitter users on five continents. Several panelists confided that they got more challenging and more interesting questions from twitter than from the ICCB attendees in the room.

In comparison, a total of 4,118 tweets came from the American Association for the Advancement of Science's (AAAS) 2011 meeting (#aaasmtg), but that meeting had over 11,500 attendees. The American Chemical Society's spring 2012 meeting (#acsSanDiego) had 3,929 tweets, but more than 16,000 attendees. Relative to other science conferences where twitter is used, 1,731 tweets from the ICCB (with slightly more than 1,000 attendees) is extremely high (personal communication, Mary Canady, Comprendia).

It is difficult to determine exactly how many users saw an #ICCB tweet as twitter does not currently monitor viewing statistics on this level. However, a rough estimate would be that between 110,000 and 150,000 twitter users saw at least one conference-related #ICCB tweet (personal communication, Aaron Muszalski, Upwell). The lower limit is the sum of the "True Reach" scores for the 176 users who posted conference-related #ICCB tweets. True Reach is a variable associated with the social media analytics software Klout (Klout.com) that measures the impact that a given tweet from a given user will have. The upper limit is the sum of the total number of followers for each of these 176 users, though it is important to note that there is almost certainly some overlap among the followers of these users.

Figure 3 shows the total number of conference-related #ICCB tweets by day alongside the number of tweets by @WhySharksMatter and the number of RTs by followers of @WhySharksMatter. These numbers demonstrate that by engaging a single prolific twitter user, organizers can greatly increase the online conversation associated with their conference.

How conferences can promote live-tweeting

Though the Society for Conservation Biology has a more explicit goal of public outreach than many scientific organizations, live-tweeting can benefit any conference. Presented here, in approximate increasing order of cost and difficulty, are five steps that conference organizers can take to promote live-tweeting. Smaller conferences may not have the resources to enact all of these suggestions, but all are capable of at least a few. Many people simply do not know that the conference is being discussed on twitter.

1. Pick a conference hashtag and announce it early and often Conference hashtags are often abbreviations of the conference's organizing society's name, and some include the year. Examples other than #ICCB include #AES11 (American Elasmobranch Society's 2011 meeting), #IMCC2 (The second International Marine Conservation Congress), #aaasmtg (the American Association for the Advancement of Science's 2011 meeting), and #SCIO12 (Science Online 2012). If the conference does not decide on a specific hashtag and announce it, confused tweeters may create several conflicting ones, which makes it harder for interested members of the public to follow along. It is also important, as demonstrated by tweets referencing Ireland's Colliery Chesterfield Band in this case, that the hashtag be unique so that when people search for tweets from the conference, that is all they find.

Conference organizers should pick a hashtag early and announce it often, for example, on the conference registration website, in the conference program, and as part of the announcements in each conference session. Including the hashtag in these daily announcements, which all conference attendees hear, would help spread the word, and would only take 15–30 s, (i.e., say "Please tweet interesting things that you hear today, our twitter hashtag is #EXAMPLE, and follow along with what's happening in sessions you aren't attending"). Some conferences list their official hashtag somewhere in the large (sometimes hundreds of pages) conference program, but few promote it heavily. One example of effectively spreading the word about a conference hashtag can be found with the AAAS 2011 meeting, which promoted the #aaasmtg hashtag through e-mails to all attendees and presenters, AAAS member newsletters, signs hung throughout the conference center, a prominent location on the conference's official website, and more (personal communication, Tiffany Lohwater, American Association for the Advancement of Science).

2. Provide a "twitterfall" or another tweet aggregator Twitterfalls are computer monitors or TV screens that display all the tweets with a particular hashtag in a slow rotation. They allow people who do not have computers to see what is being discussed on twitter. A few of these in central locations at the conference center would allow almost everyone to see the twitter conversation.
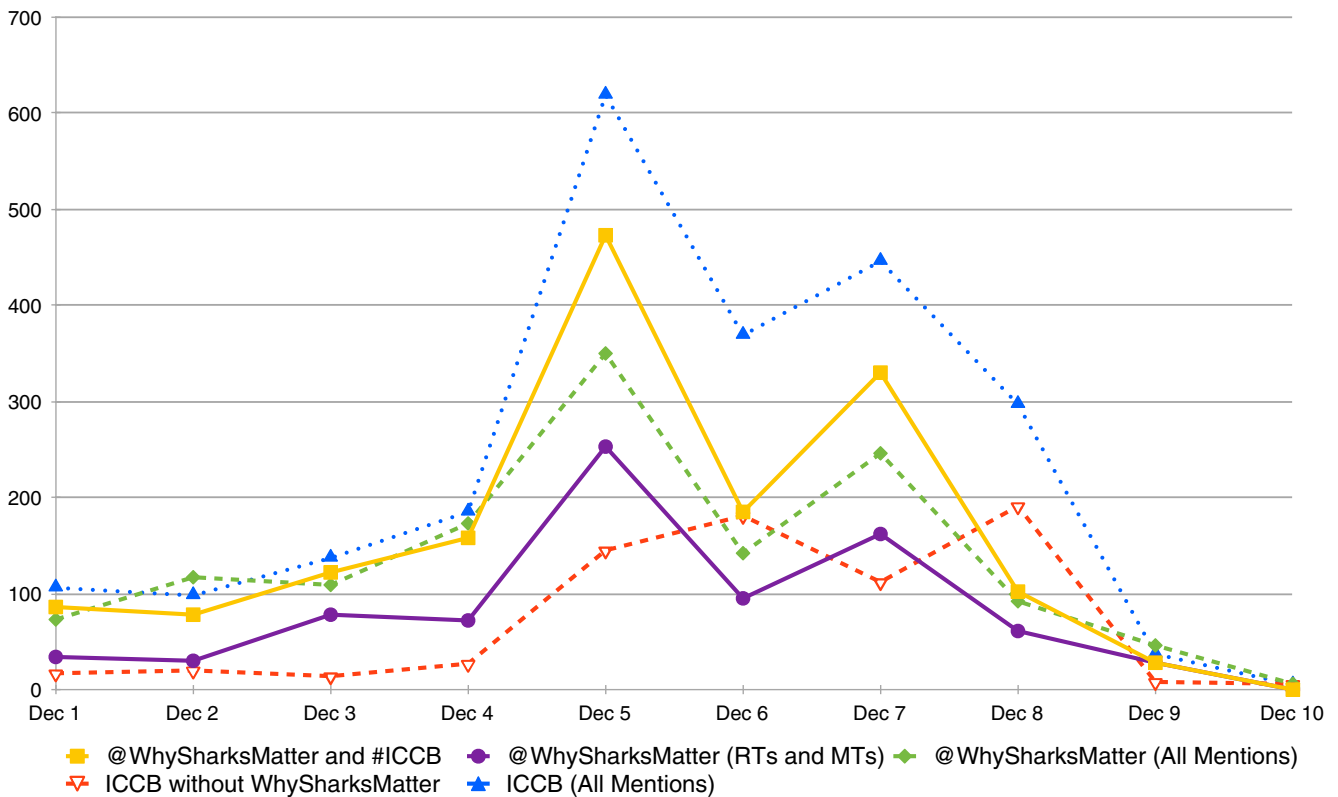
Fig. 3 The number of conference-related #ICCB tweets from December 1st to December 10th of 2011 (data from Radian6, provided by Upwell). The *blue line* (dashed line, closed triangles) shows all conference-related #ICCB tweets. The *red line* (dashed line, closed triangles) shows all the conference-related #ICCB tweets without counting the author's (@WhySharksMatter) tweets and re-tweets (RTs), showing that although 176 total twitter users participated, the author had a major impact on the overall discussion. The *purple line* (solid line, closed circles) shows RTs and MTs of the author's tweets (an MT is very similar in principal to an RT, but indicating that a slight modification has been made to the original tweet, usually to reduce the number of characters)

3. Provide free wireless internet to those who are live-tweeting a conference, or to everyone at the conference Users cannot tweet without wireless internet (smartphones are an obvious exception, but most prefer to tweet on a full keyboard laptop or on a tablet computer whenever possible). Conference center wireless is often extremely expensive, and many of the people most likely to tweet are students. Providing free wireless to people who are tweeting would help increase the number of people who tweet. Many conferences already purchase a limited amount of wireless for official conference business, and can simply give twitter users access to this. To reduce abuse if organizers are paying by the megabyte, it is possible to make it so people accessing a particular wireless network can only access one website (for example, twitter), but the author discourages this because it prevents tweeters from including links to photos, scientific papers, or websites in their tweets. If wireless internet is available to all conference attendees, in addition to encouraging people to "follow along with twitter hashtag #EXAMPLE to see what people are saying about the talks you may have missed" in the announcements, it would go a long way to increasing the use of conference tweeting.

4. Provide free conference registration to people who tweet (or a select few) Many conferences provide free registration to students who volunteer to help set up presentation rooms, run projectors, etc. Tweeting is a similar service to the conference, and similar rewards would help to encourage its use. It would be nice to provide this service to anyone who tweets, but not everyone does it at the same rate—many users only tweet a few times during a conference, while a few tweet quite often and are more skilled. More and better tweets benefit the conference more, so this reward could be focused on those who provide more and better tweets. It could also be provided preferentially to people who have more followers—the average twitter user has approximately 100 followers, which would not be as useful to a conference whose goal is reaching the interested public as a twitter user with thousands of followers.

5. Engage a skilled twitter user to come to the conference This is the ultimate statement that tweeting is valued and encouraged. As with conference registration, conferences may want to focus on tweeters who can provide the greatest impact: people with large numbers of followers, a

willingness to tweet throughout, a demonstrated ability to communicate science to the public, etc.

Conclusions

If properly applied, twitter can be a great tool for public education and outreach from scientific conferences. A single influential twitter user who live tweets a conference presentation can spread the word to thousands of interested citizens around the world, and greatly impact the conversation about a conference. A group of twitter users can accomplish even more. The experiment in online outreach conducted at the 2011 ICCB was a huge success, and other conferences can, should, and will soon follow.

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