Use of Tethys Engineering by the Marine Renewable Energy Community

Peer Review Report

September 2020

Hayley Farr
Jonathan Whiting
Andrea Copping
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1.0 Introduction

In partial fulfillment of the Annual (SMART) Milestone for Q4 of FY20, this report details the results of the peer review process carried out on the use and function of Tethys Engineering. The pertinent part of the Milestone is:

Report on execution of Q1 Plan and Peer Review of PRIMRE Knowledge Hubs.
2.0 Methods

During Q4 of FY20, Pacific Northwest National Laboratory (PNNL) solicited broad feedback from a self-selected subset of the greater marine renewable energy community on the use and effectiveness of key pages on Tethys Engineering. Respondents were solicited using an online Survey Monkey survey between July 29 and August 31, 2020 via emails to all 2,328 Tethys Engineering email subscribers on July 29 and August 20, 2020 and via the Tethys Engineering Blast on July 31, August 14, and August 28, 2020.

The survey included 8 questions (Table 1), some of which were quantitative while others allowed for open-ended answers. The answers for all multiple-choice questions were collated and analyzed to determine use of Tethys Engineering. For questions that allowed for open-ended feedback, the responses were collated and analyzed to determine respondents’ favorite features and what can be improved or expanded upon.

Table 1. Questions included in the 2020 Tethys Engineering Peer Review online survey.

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Question</th>
<th>Choices</th>
</tr>
</thead>
</table>
| 1 | Which renewable energy industry are you interested in? | − Current Energy (e.g., Tidal, Ocean Current)  
− Wave Energy  
− Ocean Thermal Energy Conversion  
− Salinity Gradient Energy |
| 2 | What is your role? | − Device Developer  
− Project Developer  
− Researcher  
− Regulator  
− Student  
− Interested Public  
− Consultant  
− Non-Profit  
− Other (please specify) |
| 3 | How have you used Tethys Engineering? Please check all that apply. | − To find literature in the Knowledge Base and/or Map Viewer  
− To receive the Tethys Engineering Blast via email  
− To search the Photo Library for photos  
− Other (please specify) |
| 4 | How effective do you find the following pages? | Rate effectiveness of:  
− Knowledge Base  
− Map Viewer  
− Photo Library  
− Organizations  
− Databases  
− Glossary |
<table>
<thead>
<tr>
<th></th>
<th>Question</th>
<th>Response Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>In your opinion, how can <em>Tethys Engineering</em> be expanded or improved upon?</td>
<td>Open-ended response.</td>
</tr>
<tr>
<td>7</td>
<td>How comprehensive do you find the literature on marine renewable energy on <em>Tethys Engineering</em>?</td>
<td>Slider from 1 to 10.</td>
</tr>
<tr>
<td>8</td>
<td>Do you know of any relevant literature (e.g., peer-reviewed journal articles, reports, theses) that are not currently on <em>Tethys Engineering</em>? Please list them.</td>
<td>Open-ended response.</td>
</tr>
</tbody>
</table>
3.0 Results and Discussion

A total of 49 responses were collected from the greater marine renewable energy community. The number of responses for each individual question varies due to respondents' ability to skip questions. The results of each question are summarized, and pertinent material analyzed, below. A condensed list of action items is provided in section 4.0.

**Question 1: Which marine renewable energy technology are you most interested in?**

Of the 49 total respondents to Question 1, 30 (61.22%) respondents selected current energy (e.g., tidal, ocean current, riverine) and 19 (38.78%) respondents selected wave energy (Figure 1). Zero respondents selected either ocean thermal energy conversion or salinity gradient energy.

![Figure 1. Respondents’ marine renewable energy technology interests.](image-url)
Question 2: What is your role?

Of the 49 total respondents to Question 2, 22 (44.90%) identified as a researcher, 10 (20.41%) identified as a device developer, 7 (14.29%) identified as a consultant, 4 (8.16%) identified as a project developer, 3 (6.12%) identified as ‘other’, 2 (4.08%) identified as non-profit, and 1 (2.04%) identified as a regulator (Figure 2). Zero respondents identified as a student or member of the interested public. Those that identified as ‘other’ specified their roles as either a government employee or an electric utility transmission services provider.

This distribution indicates that *Tethys Engineering* is reaching its intended audience of researchers, device and project developers, and consultants engaged in the marine renewable energy field. Additional outreach and engagement directed towards regulators, students, and the interested public may ensure that these groups are aware of and using *Tethys Engineering* as well.

![Figure 2. Respondents’ roles in the marine renewable energy community.](image-url)
Question 3: How have you used Tethys Engineering? Please check all that apply.

Out of the 48 total respondents to Question 3, 39 (81.25%) use Tethys Engineering to receive the Tethys Engineering Blast via email, 35 (72.92%) use Tethys Engineering to find literature in the Knowledge Base and/or Map Viewer, 12 (25.00%) use Tethys Engineering to search the Photo Library for photos, and 3 (6.25%) selected 'other' (Figure 3). Those that selected 'other' specified that they use Tethys Engineering to announce relevant research publications, find jobs, access the databases and other information, and learn about tools and conferences in the area.

The most used features of Tethys Engineering are the Tethys Engineering Blast and the Knowledge Base and/or Map Viewer, indicating good alignment with the mission of Tethys Engineering. Outreach, engagement, and content curation consume the greatest amount of PNNL staff time, so these features’ usage rates are also in line with the level of effort required to maintain them. The Photo Library receives some usage now, but as a relatively new and expanding feature of Tethys Engineering, we expect it will receive greater usage following upcoming outreach and engagement.

![Figure 3](image-url). Various ways respondents have used Tethys Engineering.
Question 4: How effective do you find the following pages?

Respondents were asked to rate specific pages on *Tethys* as not effective (-2), somewhat effective (-1), moderately effective (0), very effective (+1), or extremely effective (+2). The weighted average effectiveness of specific pages was rated from -2 to +2 as: +1.04 for the Databases page, +1.00 for the Knowledge Base, +1.00 for the Glossary, +0.81 for the Photo Library, +0.77 for the Map Viewer, and +0.73 for the Organizations page.

All pages were viewed positively by respondents. Respondents viewed the Databases and Knowledge Base pages as the most effective, and the Organizations page as the least effective. However, it is important to note that these numbers reflect perceived effectiveness of the page, which could be interpreted as either ease of functionality or usefulness of the information, or most likely a combination of the two. Nonetheless, we were surprised to see that the Databases page ranked as most effective.

Not reflected in these statistics are the numbers of respondents who indicated that they do not use certain pages. Out of the 49 total respondents, 28 (60.87%) don’t use the Glossary, 25 (53.19%) don’t use the Organizations page, 23 (46.94%) don’t use the Map Viewer, 22 (45.83%) don’t use the Photo Library, 21 (45.65%) don’t use the Databases page, and 10 (20.41%) don’t use the Knowledge Base. Respondents who stated that they don’t use a particular page may have not been aware of the resource; therefore, additional outreach and engagement emphasizing the availability of some of these features may be necessary.

Question 5: What do you like best about *Tethys Engineering*?

Out of 49 total respondents, 23 responded to Question 5. The open-ended responses have been combined or merged where there was considerable commonality (Table 2).

<table>
<thead>
<tr>
<th>Table 2. Respondents’ open-ended responses on what they like best about <em>Tethys Engineering</em>.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Response</strong></td>
</tr>
<tr>
<td><em>Tethys Engineering</em> Blast</td>
</tr>
<tr>
<td>comprehensive source of information</td>
</tr>
<tr>
<td>Knowledge Base</td>
</tr>
<tr>
<td>quick and easy to keep up with new publications</td>
</tr>
<tr>
<td>&quot;Simple to use and very clean display strategy on the different web pages. Large database available with efficient searching tools.&quot;</td>
</tr>
<tr>
<td>&quot;That I can point students to a specific site for gathering information on marine renewables.&quot;</td>
</tr>
<tr>
<td>&quot;Keeps us up to date on latest news. We wish we knew about the various pages listed above. We'll look for them in future.&quot;</td>
</tr>
<tr>
<td>&quot;very important resource for the sector&quot;</td>
</tr>
<tr>
<td>&quot;integration of the community on its different areas&quot;</td>
</tr>
<tr>
<td>&quot;collates related science and industry news into one place&quot;</td>
</tr>
<tr>
<td>&quot;it’s all good&quot;</td>
</tr>
</tbody>
</table>
Question 6: In your opinion, how can Tethys Engineering be expanded or improved upon?

Out of 49 total respondents, 21 responded to Question 5. The open-ended responses have been combined or merged where there was considerable commonality (Table 3).

Table 3. Respondents’ open-ended responses on how Tethys Engineering can be improved.

<table>
<thead>
<tr>
<th>No. of Comments</th>
<th>Comment</th>
<th>Response*</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>“Already excellent”, “fine the way it is”, etc.</td>
<td>Thanks!</td>
</tr>
<tr>
<td>1</td>
<td>“Being able to access all papers without having further memberships to enable access.”</td>
<td>Due to copyright laws, we are unable to do this. However, whenever copyright allows, we attach a PDF version of a document directly to Tethys Engineering.</td>
</tr>
<tr>
<td>1</td>
<td>“At this point, I need to know how to obtain the raw data regarding the significant height of the waves.”</td>
<td>We don’t host raw data on Tethys Engineering, however, we recently developed linkages to MHKDR, which does host this sort of information.</td>
</tr>
<tr>
<td>1</td>
<td>&quot;International linkages to similar resources (interoperability)&quot;</td>
<td>We are currently working to enhance the interoperability of Tethys Engineering and other PRIMRE Knowledge Hubs in the US, but we plan to expand these linkages to international resources in the future.</td>
</tr>
<tr>
<td>1</td>
<td>&quot;Monthly webinars to know better about the community, podcast or news about the last things happening.&quot;</td>
<td>We’ll be holding a webinar on some of Tethys Engineering’s new features soon, but this is great feedback! We’ll look into other possible forms of engagement with the community.</td>
</tr>
<tr>
<td>1</td>
<td>“Expand photo library to also include research? (flumes, scaled models, simulations?)”</td>
<td>We’re limited by what developers and researchers are willing to share, but this is great feedback!</td>
</tr>
<tr>
<td>1</td>
<td>“Maybe email every two weeks and not every week?”</td>
<td>Both the Tethys Blast and Tethys Engineering Blast are bi-weekly newsletters. If you’re subscribed to both, you’ll receive a Blast weekly.</td>
</tr>
<tr>
<td>1</td>
<td>&quot;Include more of the ongoing work and collaborations with Europe and the Americas”</td>
<td>We’ll keep this in mind as we continue to add literature to the Knowledge Base and highlight various efforts in the Blast.</td>
</tr>
<tr>
<td>1</td>
<td>“Add a brief vignette in each Blast showing an example of how to use the rest of Tethys Engineering. If the Blast helps me realize what the rest of the resource can offer, I'm more likely to engage with it. Looking at question 8, perhaps add this question to the end of every Blast so the feedback is consistently more timely?”</td>
<td>Great feedback! We’ll be sure to continue highlighting the various resources on Tethys Engineering in the Blast, and will look into adding a note similar to Question 8 to encourage more document submissions from the community.</td>
</tr>
<tr>
<td>1</td>
<td>&quot;Add more resources like links to conferences and workshops.&quot;</td>
<td>We highlight these in the Event Calendar, but we’re still working on connecting the Tethys and Tethys Engineering Event Calendars so that both show all relevant events.</td>
</tr>
<tr>
<td>1</td>
<td>“The literature links in the email blasts seems like a random scattershot with</td>
<td>Acknowledged. We’re not able to include citation counts, as these are constantly</td>
</tr>
</tbody>
</table>
limited selectivity/curation. The literature assembly seems quite comprehensive, but, without citation counts or being able to see the journal the work was published in (in the default panel), it's hard to know if the paper is worth reading."

<table>
<thead>
<tr>
<th>1</th>
<th>&quot;Need to explain the full benefits&quot;</th>
<th>We’ll be sure to highlight the various features of <em>Tethys Engineering</em> more!</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&quot;The website is a little busy looking, but not a big deal.&quot;</td>
<td>Acknowledged.</td>
</tr>
<tr>
<td>1</td>
<td>&quot;More job opportunities and conference info (I get a lot from that section of the blasts)&quot;</td>
<td>Thanks! We’ll be sure to continue highlighting these.</td>
</tr>
<tr>
<td>1</td>
<td>&quot;Webinars, technical assistance&quot;</td>
<td>We have a few upcoming webinars, but we’re not sure what ‘technical assistance’ <em>Tethys Engineering</em> would be able to offer.</td>
</tr>
<tr>
<td>1</td>
<td>&quot;Less frequent reporting&quot;</td>
<td>Acknowledged.</td>
</tr>
</tbody>
</table>

*These responses are not shared with the respondents who made the initial comments. Rather, these responses are generated for the purpose of systematically reviewing comments and documenting potential action items.*
Question 7: How comprehensive do you find the literature on marine renewable energy on Tethys Engineering?

Out of the 49 total respondents, 40 responded to Question 7. Respondents were asked to pick a number between 1 (not comprehensive) and 10 (extremely comprehensive). On average, respondents rated Tethys Engineering’s comprehensiveness at 7.7, with individual ratings ranging from 1 to 10.

At a high level, this shows that most respondents find the literature on Tethys Engineering very comprehensive.

Question 8: Do you know of any relevant literature (e.g., journal articles, technical reports, conference papers, theses) that are not on Tethys Engineering? Please list them.

Out of the 49 total respondents, 12 responded to Question 8. Most wrote some variation of “none”, however, 6 documents were identified and added to Tethys Engineering:

4.0 Action Items

Based on the results of the peer review process, we have identified the following action items as potential opportunities to enhance the use and function of *Tethys Engineering*:

- Continue effort to enhance linkages and interoperability between *Tethys Engineering*, other databases, and international resources
- Regularly highlight various features of *Tethys Engineering* in the Blast
- Remind *Tethys Engineering* Blast subscribers to manage their subscription preferences to only receive content relevant to their interests
- Consider addition of ‘Journal’ as a taxonomy in the *Tethys Engineering* Knowledge Base
- Target outreach and engagement towards audiences interested in ocean thermal energy conversion and salinity gradient energy